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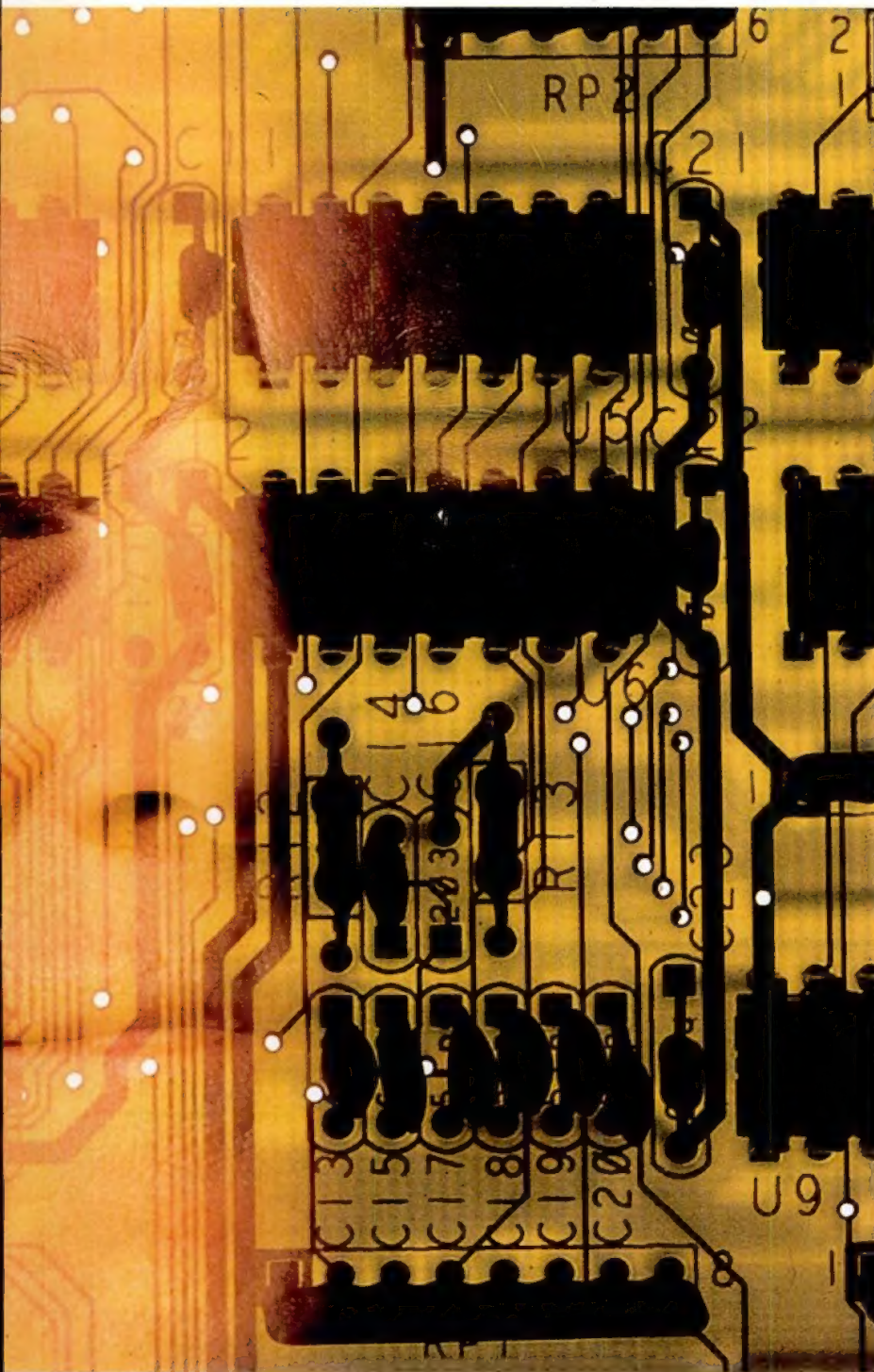
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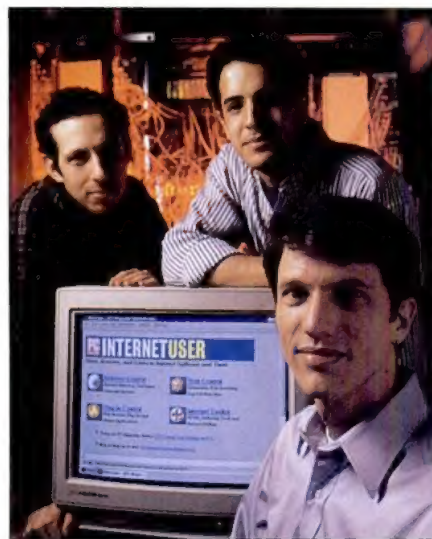
It seems as if every time we look up from our desks, another software developer has arrived at our offices to demonstrate another cool Internet product. It may be a new browser that shows off the wonderful world of the Web in a new way. Or it may

be a plug-in, designed to make a Web browser more exciting with sound and video. It may be a Web authoring tool that makes it easier to create great pages, or maybe it's a Web server to publish those pages or a tool to connect those servers to a database. As often as not, these tools are designed as much for use within a company in an internal web, or *intranet*, as for connecting to the outside world.

The proliferation of such products is nothing short of amazing. Check out our evaluation of products designed for intranets, "The Web Within." Our networking team has come across more than 40 products for collaboration, document publishing, database connectivity, searching, and more.

Simon Eskow and Eyal Rabinovitch, our researchers on the networking and Internet teams, have their hands full just keeping up with all the new software coming out, and you probably do, too. That's why we've taken the information gathered by our researchers as well as reviews from PC Labs and used them to create a new Web site that we call InternetUser.

The site, created by technical associate Tom Giebel and our online team, brings together extensive lists, descriptions, links, and reviews of hundreds of Internet products. You can visit InternetUser simply by clicking on its



Caught up in the Web: Simon Eskow, Eyal Rabinovitch, and Tom Giebel.

button at PC Magazine's Web site (<http://www.pcmag.com>).

We haven't seen such a proliferation of new products since the early days of the PC industry. InternetUser will track what's new, and PC Magazine will evaluate all this new software so you know which products are worth your time.—*Michael J. Miller*

PC Magazine, ISSN 0888-8507, is published twice a month except in July and August, for \$49.97 for one year. Ziff-Davis Publishing Company, L.P., One Park Ave., New York, NY 10016-5802. Second-class postage paid at New York, NY 10016-5802 and at additional mailing offices. POSTMASTER: Address changes to PC Magazine, P.O. Box 54093, Boulder, CO 80322-4093. GST registration number: R-123669673; in Canada, R140496720. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 266477.

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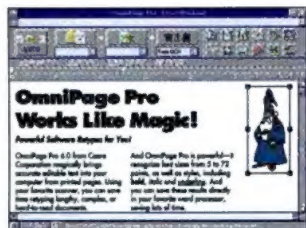
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PC Magazine At Home



POWERHOUSE

BY BILL HOWARD Home PCs come in two categories:

those meant for more experienced users and those designed for first-time buyers who need a little more help getting to know their systems. We've rounded up 11 of the top home computers on the market and put them through their paces. Find out which machines offer you the most power and performance, which have all the extra touches to make their setup and operation as fast and painless as possible, which come with the extra software and accessories you want, and which one has the best mix of features for a price that fits your budget299

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Information Managers

Good-Bye, Rolodex! So Long, Sticky Notes!

BY DON WILLMOTT If you haven't automated your contacts, schedules, tasks, and information, now's the time. Whatever your needs may be, today's information managers offer such a selection that your work style can truly dictate which product ends up on your PC. And many packages now let you maintain this organization anywhere as you replicate on the road. Out of the 18 products we review, one is bound to help you get rid of the sticky notes, address files, calendars, and planners that dominate your desk165

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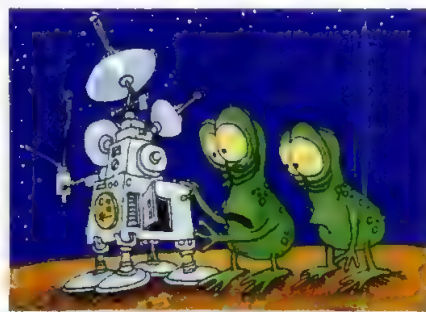
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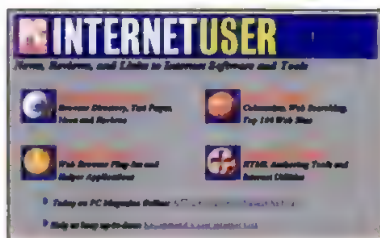
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What's New Online

To help you keep up to date on the latest computer-industry news, PC Magazine Online has introduced three new sections. **NewsWatch** offers at-a-glance summaries of the latest-breaking computer news. **NewsScan** is a daily roundup of the top computer-related news stories from the mainstream press, and **Trends Online** will continue to deliver the kind of in-depth news analysis that our readers have come to expect from PC Magazine Online.

SPRING 1996 ISSUE

The Top 100 Web Sites

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Pentium Pandemonium!

We test and review

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- 31 Pentium 150- and 166-MHz systems
- 41 Pentium portables

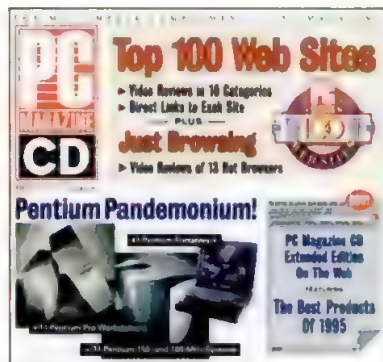
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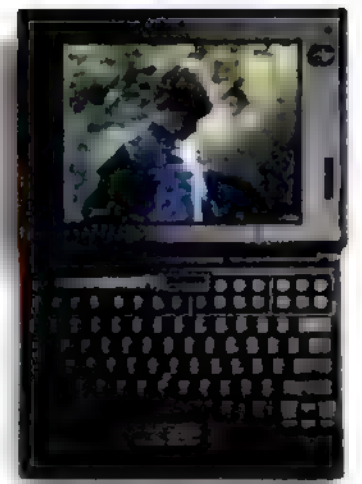
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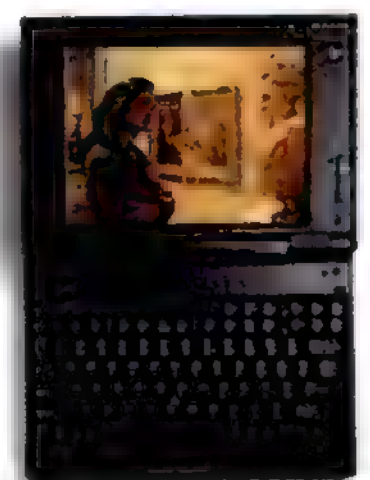


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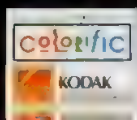
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Letters

QUESTIONING TECHNICAL EXCELLENCE

Regarding your "12th Annual Awards for Technical Excellence" (December 19, 1995): Is Windows 95 technically superior to OS/2 or Windows NT? Is this award based on glitz or guts, superficiality or depth, sales or substance? Windows 95 may be better than the operating system it replaces, but it is hardly superior to a true 32-bit operating system.

LAWRENCE B. HURD
Farmington, Connecticut

You praise Windows 95 for bringing to the table technology that already exists in OS/2. I thought technical excellence meant being the best technically. Windows 95 was a great marketing scheme, but you need to get past the hype. I don't know anyone who switched to Windows 95. I do, however, know a lot of people who have chosen Windows NT.

JOHN OZECOWSKI
via the Internet

You had two good candidates this year in OS/2 Warp and Windows 95, but I think you picked the wrong one. Every comparative evaluation has clearly shown that while Windows 95 may be easier to learn and use, OS/2 performs the tasks of an operating system better. Multitasking, object orientation, robustness, raw power, you name it: From the technical standpoint, OS/2 is clearly superior.

MIKE DONEHOO
Alpharetta, Georgia

How do you see being a year late with an operating system that falls short of many of the standards that were expected as "technically excellent"? Unix had preemptive multitasking 15 years ago, Macintosh had multitasking 10 years ago, OS/2 had it 5 years ago, and now you are praising Windows 95? To me it is a day late and several dollars too much.

BRETT LITRELL
via the Internet

I am shocked that you gave Windows 95 an award for technical excellence. Windows 95 is anything but technically excellent. It does not get rid of DOS, it has a lot of 16-bit code, and it does not protect itself against errant programs. Even Microsoft has backed off and now recommends Windows NT for anyone running mission-critical applications. This is not the mark of a technically outstanding product.

ARI SHAPIRO
via the Internet

Another great issue. I have to disagree, however, with your choices for winning operating systems: Windows 95 and runner-up OS/2 Warp. Windows 95 was the worst installation in my life. I was so frustrated I gave up and put



*Windows 95 may be better,
but it is hardly superior to
a true 32-bit OS.*

good old DOS and Windows 3.1 back in my system. In addition, I don't see how OS/2 can be a runner-up without native applications. I think the vote should have gone to DOS 6.22. That installation was a piece of cake, and there's no shortage of applications.

JAMES CANNON
via the Internet

Your choice of Windows 95 as best operating system was shocking. OS/2 Warp is widely regarded as the technically superior product. Windows 95 is certainly a significant improvement over its predecessors and is likely to dominate the PC operating-system market. Its inherent architectural flaws, however, should have been more seriously considered before you granted it an award for technical excellence.

DANIEL W. EMMER
Buffalo, New York

How can you give Delphi and Visual Basic 4.0 awards for best development tools and completely overlook the superb Clarion for Windows? Perhaps you thought it was too technical a tool for your audience. But in my opinion, a nontechnical user can create a database application more easily and quickly with Clarion for Windows than with either of the two tools you mentioned.

WILL FASTIE
Baltimore, Maryland

Including Visual Basic 4.0 as a finalist seems a bit flaky to me. The product lacks a decent database engine, lacks object orientation, and has a scripting language that is as robust as in-

stant decaffeinated coffee. Rapid applications development tools means client/server to me, and Visual Basic 4.0's entrance into this arena has been lackluster at best. Its lack of database support, need for add-ons, and weak scripting language make this product more of a neat toy than a powerful development tool.

RUSSELL LOWELL
via the Internet

MISSING THE POINT

"Sun Ultra 1: Unparalleled Performance, but at a Price" (First Looks, December 19, 1995) is a fine example of comparing apples and oranges. The users who buy Unix workstations, such as the Sun, are not buying them to run standard business applications like Excel and Word. At my company, we use workstations for engineering design, applications native to the Sun, and tools that take advantage of the superior Unix networking built into the workstation. Of course, a 16-bit Windows application will run slower on the Sun, as compared with the 32-bit version running on a Pentium Pro, but a native application running on the Sun will blow past the Pentium Pro.

ANDY PETERS
Lyndhurst, New Jersey

We included Word and Excel testing so that we could compare the Sun Ultra 1 with Pentium Pro and Pentium PCs.—Ed.

FREEDOM OF CHOICE

As a satisfied OS/2 user, I am getting tired of computer magazines and their columnists repeatedly proclaiming the imminent death of OS/2 Warp. The latest is Bill Howard's column "PC Predictions for '96" (January 9, 1996). As a consumer, I demand choice and quality in the marketplace. A publication like *PC Magazine* should champion consumer choice. Don't tell us to be satisfied with inferior products. You do consumers a disservice if you do not highlight the power and advantages of the alternatives to dominant products.

GARY R. WALSH
via PC MagNet

You have an excellent magazine, but there is one thing about it that I really, really hate. Your editors tend to declare products "dead," even when they are alive and well. For example, Howard bids OS/2 a less than fond farewell in his column, but I believe nothing could be further from the truth. I don't think anyone should declare a product dead until it is completely out of production. The industry should be allowed to make its own choices. Fortunately for OS/2 and the 486, the industry does have a mind of its own.

JOHN DOUGLAS STANLEY
via PC MagNet

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CIRCLE 122 ON READER SERVICE CARD

Letters

Howard's editorial column included at least one very hollow prediction. I would like to make clear some important facts that Howard may have overlooked in his forecast of OS/2's future. IBM's OS/2 will not be "packing it in." In fact, according to IDC, OS/2 gained three share points of the total operating-system market in 1995, despite the much-hyped launch of Windows 95. IBM plans several new additions to the OS/2 family in 1996, including OS/2 Warp Server, a new integrated file/print and application server; Directory and Security Server, which will provide global directory capability to OS/2 Warp Server; and the next version of OS/2 Warp. In short, IBM remains unequivocal in our commitment to OS/2 and to delivering high-quality client/server solutions to enterprise customers and connected customers.

JOHN W. THOMPSON
*General manager, Personal
Software Products, IBM*

THE AMERICAN WAY

Bill Machrone seems to be full of goodwill in his earnest endeavors to register all his shareware ("Look Out for Shades of GRAYS," January 9, 1996), but let's be realistic. In the constantly updating and changing online world, it simply isn't practical to register each and every program you have. Undoubtedly someone will soon come out with an even better program that renders yours obsolete. And giving my credit card number to some unknown fellow in northern Nebraska isn't exactly my cup of tea.

AMI RODAN
via the Internet

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CORRECTIONS AND AMPLIFICATIONS

Our recent review of IBM's WebExplorer 1.03 ("Internet Access: Just Browsing," March 12, 1996) mistakenly stated that the product will not let you scroll a document before it is fully retrieved. This problem with Version 1.0 was fixed in Version 1.03.

TURKEY TALK

The concept of an inexpensive Web terminal has been roundly panned in the press, most recently by John C. Dvorak ("Another Turkey of an Idea," January 9, 1996). Dvorak and others make very persuasive arguments against the idea, and I might have agreed except that I recently installed an inexpensive terminal at home. My family now uses it for e-mail, weather via gopher, our name and address database, and even Web access (minus the graphics) using Lynx. Now I can't get near my kitchen terminal because it's used so much.

BOB BAGGERMAN
Atlanta, Georgia

Dvorak's column on Web terminals is right on. What a waste of energy. Just think of all the wasted stuffing in magazines devoted to this turkey.

G. KERAMIDAS
via PC MagNet

For a smart guy who writes so many insightful columns, Dvorak really penned a turkey this time. He knocks the Web terminal idea because it will not only clip the wings of Bill Gates, but it will also take some gravy away from him and his fellow PC-industry editors.

RICHARD ROSINSKI
via PC MagNet

I think Dvorak has completely missed the point. Every technology can function in any of three modes: toy, tool, or appliance. I suggest that today's PCs and every other variety of general-purpose computers are tools. People who use them have a strong, constant interest in technological improvements and will invest money, time, and effort. The proposed Internet terminal, on the other hand, would be an appliance, giving the average person access to the enormous wealth of the Internet at minimal cost and effort. In time, many people who currently need and use PCs as tools might find that an appliance is more than adequate, especially if they could rent application software.

STUART M. DELUCA
Austin, Texas

If Dvorak is trying to stimulate controversy, he has succeeded. If he is trying to make sense, he has failed. In "Another Turkey of an Idea" and Inside Track (January 9, 1996), he is simultaneously at opposite ends of the spectrum. On the one hand, he shows restraint and vision by not jumping on the "applets to do everything" bandwagon. On the other hand, his suggestion that you should be a telecom-

munications expert to be a Web manager misses the two main ingredients that make a good Web site: content and style. To suggest that a telecommunications expert should run a Web site is like suggesting that the truck driver who delivers the magazines to the post office should be CEO of Ziff-Davis.

BEN LOPEZ
via PC MagNet

I would like to take Dvorak to task for his column downplaying the Internet as a viable replacement for commercial online services. I had Internet access through several of these services and quickly saw that because of cost, speed, and convenience, the only alternative for Web access was a dedicated provider.

THOMAS LAURY
via the Internet

THE INTERNET EVOLUTION

Jake Kirchner's column "57 Channels (and Nothin' On)" (January 9, 1996) reminded me of the early days of the PC. The first PCs were serious and expensive business tools reserved for computer professionals. With the introduction of the graphical user interface, the justification for having a PC evolved from one of need to one of status. Now the desktop PC is as ubiquitous as the pen and pencil. What is going on with the Internet today is very similar. The millions who are logging onto the Internet are not looking for content; they want to be "connected." The truth is that the Internet has become a rapidly evolving social medium like the home PC and the TV and will become whatever its users want it to be. The one beauty to all this change, however, is that the Internet gives the same voice to a 12-year-old that it does to the president of the United States. It knows no boundaries or social status and is nearly impossible to censor, despite the misguided effort of ignorant and misinformed politicians.

MARK B. WINDFELDT
Minneapolis, Minnesota

So Kirchner thinks the wired nation is a done deal. I don't know where he lives, but I live just 30 miles south of the largest city in Oregon, and though I would love to find out what this Web thing is all about, I can't. None of the online services have seen fit to put a local access number anywhere near my home. I would use their services if I could, but I refuse to pay long-distance charges on top of user fees. Oh, the trials of the regionally challenged.

WALTER JAQUITH
Lafayette, Oregon



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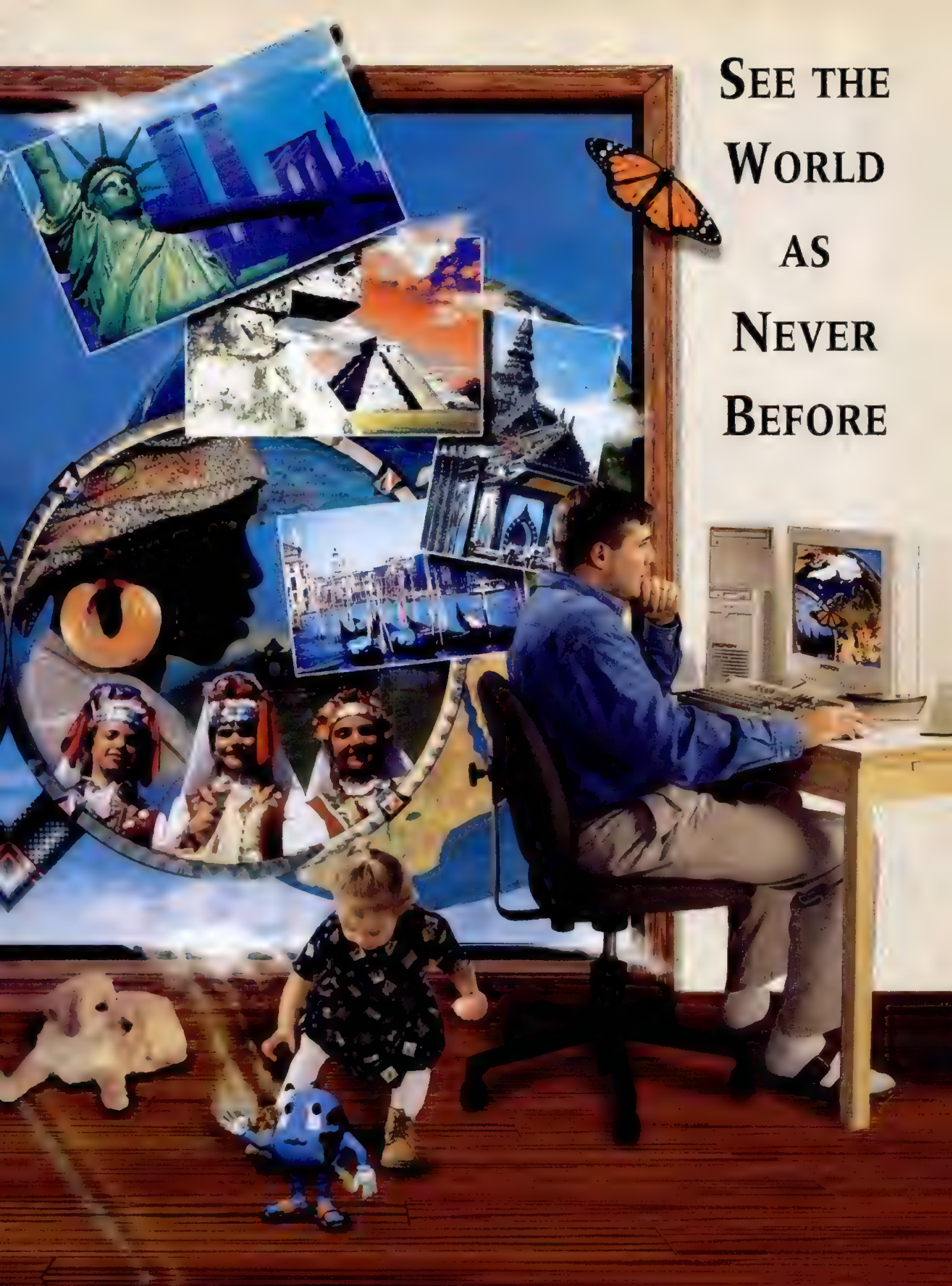
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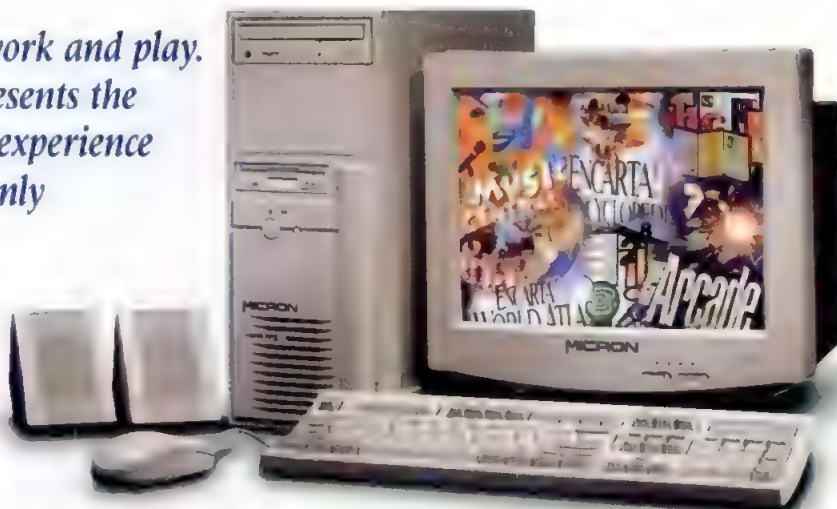


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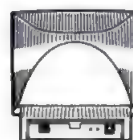


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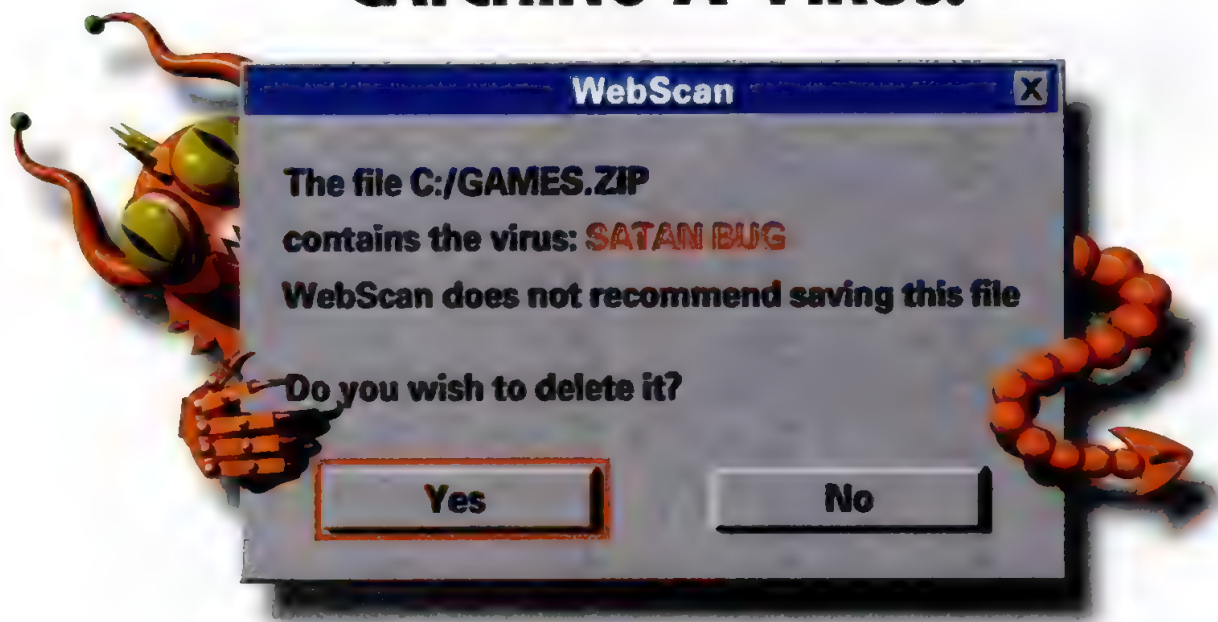


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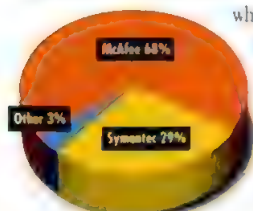
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Netscape/Microsoft: Separated at Birth?

Recently, I attended developer conferences for Netscape and Microsoft, both held at San Francisco's Moscone Center. Despite the keen competition, I came away thinking how much the two companies have in common. Both are focused on the next

generation of Internet applications and sites, and both sound like they've been using the same playbook.

Consider their visions for the Internet. Netscape talks about "rich content" and how the Internet will become more dynamic, how each new release of Navigator will integrate emerging media formats. Its flagship product, Netscape Navigator, isn't a browser anymore because you want to do more than browse, you want to interact. Now it's a client, with growing mail, news, and collaboration features.

Microsoft isn't satisfied with static content either. It wants an "active Web" and, toward that end, the company has introduced ActiveX technologies, a platform for Internet objects, which will first appear in Explorer 3.0. Microsoft talks about new standards for getting material from databases and for hosting multimedia components. Like Netscape, Microsoft is a proponent of integrating mail and news into the client.

Microsoft's plan for the Internet is simple: integrate the browser with the Windows Explorer—a powerful idea and one that, if it succeeds, would make Windows even more pervasive. Netscape has the bigger share of the browser pie now, but remember what happened with word processors.

Both companies want to be *the standard platform*. Netscape talks about open strategies on open systems: Windows is big, bad, and closed. But then Netscape turns around and talks about Navigator being the "universal platform." Hmm... it sounds like Netscape's concept is that you can choose any OS, as long as you're running Netscape's software.

Strangely, Microsoft is talking about how open it is, how it is working through the standards committees while Netscape is busy creating its own standards. There's some truth to this, but I'm sure we can all think of instances in which Microsoft enacted its own standards despite other industry groups.

If the messages are similar, the implementations are very different. Netscape stresses plug-ins, Java applets, and JavaScript; and the company says it will develop something



BROWSER BATTLE

Netscape has the bigger share, but remember what happened with word processors.

called JavaScript Wiring to tie everything together. It wants people to license its clients—a reasonable strategy, particularly for a company with 50 to 90 percent of the browser market. Netscape has introduced a two-tier server strategy comprising an "industrial-strength" server suite called SuiteSpot and FastTrack, a low-end solution spurred by Microsoft's free Internet Information Server (IIS) for Windows NT.

Microsoft has been forced to play catch-up. It licensed Java, adopted the standard used for Netscape plug-ins, and implemented HTML extensions for its own browser such as frames. Now Microsoft is emphasizing its own ActiveX format—a new, sexier name for what used to be called OLE Custom Controls (OCXs) and before that Visual Basic Extensions (VBXs), but now moved to the Internet. The key is that it will run Java applets as ActiveX objects, and the software runs VBScript as well as JavaScript.

Still, if you're creating a Web site today, it's easy to see why you would support Netscape's approach: There are more Netscape browsers, and even Microsoft supports Netscape's standards.

While there are a lot of OCXs, many are too big and need to be retooled for the Web. Besides, many browsers don't support them.

That's why Microsoft needs to get more people using its browsers. It is apparently so afraid of Netscape that it is placing America Online on the Windows 95 desktop in exchange for AOL agreeing to use Explorer and ActiveX. On the server side, Microsoft sees Windows NT (with IIS and Back Office) as the platform. Obviously, Microsoft views Netscape's servers as a real threat or it would be charging for IIS. Same for the AOL deal. After all, you don't see Microsoft giving away Word, do you?

Like late-night hosts David Letterman and Jay Leno, publicly both companies talk about how there is room for both of them in a growing market. But in less guarded moments, both sound like they can't wait to kill off the other. The two companies may not like each other, but they are looking more and more alike every day. □



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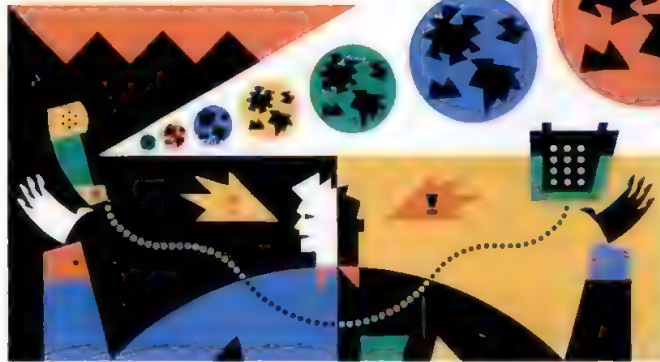
Telecom deregulation stirs up competition.

AT&T's emergence in the Internet access market is likely to attract throngs of new Web visitors, but it's high-speed technologies like ISDN and cable that will keep them there. Now that telecommunications deregulation has unleashed all kinds of businesses into the competitive arena of providing telecom services, more technologies and competitors are likely to enter the scene.

Hoping to attract its 80 million residential long-distance customers to the Internet with an offer of 5 free hours a month, AT&T debuted its WorldNet Internet service at a splashy introduction in February. Unlimited access costs \$19.95 a month for AT&T long-distance customers and \$24.95 for all others. WorldNet, which provides connections of up to 28.8 Kbps over standard phone lines, brings with it the clout of AT&T and should pose a concern for small Internet service providers (ISPs).

But AT&T's offerings don't intimidate Netcom On-Line Communications or PSINet. As two of the country's largest and most well-known ISPs, Netcom and PSINet together represent over 400 points of presence on the Internet and have almost 400,000 subscribers. Both also offer technical-support policies and software offerings that match those of AT&T.

So if it's not AT&T that's keeping PSINet CFO Dan Cunningham awake at night, what is? The Regional Bell Operating Compa-



nies (RBOCs)—your local phone company. So far, the RBOCs haven't entered the Internet playing field beyond providing the connections between Internet service providers and users. But that may soon change.

Only one day after the World-

Net announcement, reports surfaced that local phone companies, with access to high-speed networks capable of connecting just about every home in the United States, would follow suit. AT&T says its ISDN service will be available this sum-

mer, but local phone companies expect to be able to provide high-speed access then as well.

Unlike long-distance carriers, local phone companies control direct connections to their customers. Your local phone company has good incentive to deploy fast network capabilities—and soon, says industry analyst Esther Dyson.

The phone companies themselves could face tough competition down the road, now that cable modems are being pitched as the next step in high-speed Internet access. Though industry watchers are quick to question the ever-fluctuating direction of the cable market, Dyson believes the potential is there for cable companies to compete in the Internet access market. "The real shakedown is 18 to 24 months down the road," says PSINet's Cunningham.—Angela Hickman

Peripherals Perk Up While Prices Plunge

PC makers cut prices, upgrade components.

Amid signs of sluggish growth in the PC market, computer makers are slashing prices: IBM, followed by Compaq, Digital Equipment, and Hewlett-Packard, recently announced significant reductions.

With an eye toward increasing its market share, Compaq has also made some sweeping—and likely influential—changes to its system configurations. New storage approaches are high on Compaq's agenda. The Compaq Deskpro 5133 and 5166 LS models now use the industry's first 120MB floppy disk drive, while

the entire Compaq Deskpro and Compaq ProLinea lines provide options for both rewritable optical drives and scanner keyboards.

Compaq's LS-120 disk drive—developed in conjunction with 3M and Matsushita (Panasonic)—is positioned as a new industry standard. The floppy disks store 80 times as much data as 1.44MB floppy disks and operate up to five times as fast. For higher-end backup, Compaq is offering its PD-CD rewritable optical

drive, which works as a standard 4X CD-ROM reader as well as a backup drive that stores data on 650MB cartridges. New Compaq machines will also have a new scanner-keyboard hybrid that lets you scan in paper documents and then edit, file, copy, and fax electronic versions of those documents via PaperPort document management software.

These product enhancements, combined with price cuts of up to 21 percent, can only mean that the company is moving toward a single objective. "Mar-

ket share, market share, market share," says Kevin Bohran, vice president of desktop marketing at Compaq.—Cade Metz



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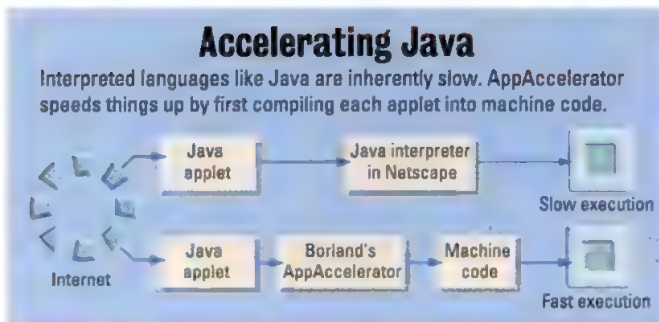
Speeding Up Web Apps

A new Java tool paves the way for cool content.

One of the key challenges of developing applications for the Web is building them so that they run fast. While Sun Microsystems is working on the Java chip, a hardware-based approach to acceleration, others are turning to software-based strategies. Borland, a longtime innovator in development tools, has a new technology programmers can use to turn out applications that fly on the Web.

Borland's C++ Development Suite 5.0 is targeted at general application development but includes several features specifically aimed at Java development. The most intriguing of these is AppAccelerator, a just-in-time Java compiler intended to replace standard Java interpreters.

Java applets downloaded from the Web are usually interpreted by a language engine such as the one included with Netscape Navigator 2.0. Language interpretation is a relatively slow process. Borland's AppAccelerator inter-



cepts the Java program and compiles it into machine code, opening the door to much faster execution—up to ten times as fast,

according to the company.

For the moment, Borland is positioning AppAccelerator as a way for developers to run their

own Java code during application development. Technically, AppAccelerator can make Java applications run faster for any Web user, but currently, end users cannot license the program. Borland says it's discussing a licensing policy internally.

Ultimately, AppAccelerator could pave the way for bigger and more complex Java applications. In the meantime, plenty of C++ developers will use it with their browsers to speed up the Java applications already out there.—Thomas Mace

Lights, HTML, Action!

Behind-the-scenes technology for Web animation.

When the curtain opens on some of today's most visually compelling Web sites, you'll see graphical images that spin, flash, float, and rotate. The techniques used to create such animation are diverse and multiplying, with two new approaches—Moving Worlds and Active VRML—promising mesmerizing Web experiences.

The four most popular approaches to Web animation include a method known as server-push, a .GIF file composed of multiple frames, a Java anima-

tion applet, and Macromedia's Shockwave program.

Server-push provides a mechanism by which a Web server and a browser establish an open connec-

For high-quality, low-bandwidth animation, Macromedia's Shockwave, a Netscape Navigator plug-in, may reign as king. Shockwave lets designers create sophisticated animation with Macromedia Director and integrate it into Web pages with HTML.

But only VRML 2.0 promises



AS THE WEB TURNS: Java applets like "Bouncing Heads" are one approach to Web animation. VRML 2.0 promises even more complex animations.

PC Magazine Online Events



WWW.PCMAG.COM. To keep you on top of computer-industry news, PC Magazine Online has introduced three new sections: **NewsWatch** offers at-a-glance summaries of breaking computer news; **News.Scan** is a daily roundup of the top computer-related news stories from the mainstream press; and **Trends Online** continues to deliver in-depth news analysis. **Web Discussion:** From April 8 to 12, discuss intranets with senior networking editor Frank J. Derfler, Jr.

PC MAGNET. From this online service of ZD Net available through CompuServe (GO PCMAGNET), you can download utilities (GO TIPS) and join in discussions of new products (GO EDITOR). **First Looks Plus:** From April 8 to 12, join a discussion of personal Web page utilities from AOL, CompuServe, and Prodigy with reviewer Edward Mendelson and guests from each service. From April 15 to 19, discuss the Panda Project's Archistrat P166 server with Panda's Jay Starrett and PC Magazine Labs director Bob Kane. **CD-ROM Plus:** From April 8 to 12, discuss Pentium notebooks with associate editor Carol Venezia.—Tin Albano

tion, pushing images until either a CGI script finishes or a user presses Stop. Although server-push does not allow complete control over image speed, this technique can achieve stunning effects.

Using the GIF89a format and the GIF Construction Set, non-programmers can compose a file out of many images that can be looped and timed. The First Internet Gallery of GIF Animation (<http://www.reiworld.com>) features an assortment of animation.

For interactive animation with sound tracks, a Java applet may be in order. Nonprogrammers can use prebuilt applets by embedding class arguments into HTML, while programmers can use Java's double-buffering clipping techniques. Sun Microsystems' Web site (<http://java.sun.com>) has a number of animation examples.

complete immersion in 3-D animation. Two proposals have been submitted to the VRML Architecture Group: Moving Worlds from Silicon Graphics, Sony, WorldMaker, and others, and Active VRML from Microsoft. Both proposals build on the existing .WRL (World) format, adding innovations such as timed events, 2-D and 3-D animation, user interaction with objects, sound effects, collision detection, and automatic frame generation.

Apple has added to VRML design efforts with 3D Metafile, a cross-platform format that preserves an object's geometry, color, shading, lighting, and texture. Apple recently announced that it will work with Netscape and Silicon Graphics on Moving Worlds.—Joshua Kerievsky

The Techies Want Performance.



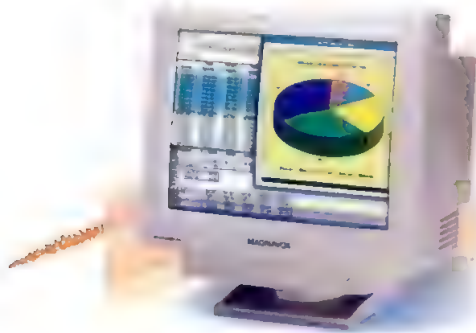
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The digital part comes into play once the film is processed. A magnetic layer on the bottom layer of the film transforms APS from an analog, chemical-based photo system to a computer-based input device. The layer stores digital information such as shutter speed, f-stop setting, lighting level, flash setting, subject identification, date stamp, and captioning that can be passed on to image-editing software and photo-lab equipment to automatically insure the quality of focus and exposure.

APS cameras can record up to 2K of data per frame but the first crop (from about 40 different manufacturers) will use only 400 bytes. The rest is reserved for future functions. Though inexpensive APS cameras won't have any special features, pricier cameras with interchangeable lenses may offer a variety of options, such as voice annotation.

Since the film stays inside a "smart" drop-in cartridge—called a thrusting cassette—even after processing, there are no strips of negatives to scratch or to lose. All printing, filing, displaying, and scanning is done directly from the cassette.

As the APS format catches on, you'll be able to drop the cassette into a variety of peripherals that connect to your PC or TV. The first peripherals will be inexpensive film readers, such as Fuji's upcoming AP-1 Photo Player, that attach to your TV. With a frame-capture device like Play Inc.'s Snappy, you'll be able to feed those images directly into your PC. And this fall Fuji plans to introduce a compact, 24-bit desktop film scanner that automatically reads APS encoding so you don't have to adjust gamma or other parameters manually to get perfect scans.

Canon, Minolta, and Nikon will also introduce peripherals that make APS a natural for inexpensive, high-quality photo input. Possible products include APS scanners that save images in Photo CD format onto CD-R drives, snapshot-size digital printers, and portable scanners that connect to personal digital assistants. —Daniel Grotta & Sally Wiener Grotta

Kodak's Semi-Digital Camera

Smart film launches a new class of PC peripherals.

Inexpensive digital cameras will eventually make today's point-and-shoot film cameras as dead as doornails. Until then, a new camera and film format called the Advanced Photo System (APS), may give digital photography a run for its money—especially among PC users.

APS images are not only far superior in quality to digital images, they're far cheaper. The least expensive APS camera (about \$100) will produce better image quality than even the best digital camera—which could cost up to \$28,000. Although APS film is only 24 mm wide and has 40 percent less surface than a standard 35-mm frame, the images offer better resolution, color, and sharpness than digital images.

The PC Card's Little Sibling

Tiny memory cards.

The Miniature Card, measuring just one-quarter the size of a PC Card, is good news for those who need to share data between a hand-held

device and a PC. SCM Microsystems, a large supplier of PC Card adapters for desktop PCs, has announced its support of the new Miniature Card standard along with AMD, Compaq, Hewlett-Packard, Intel, Philips Electronics, and Sharp. The 38- by 33-mm Miniature Cards are memory cards designed by AMD, Fujitsu, Intel,

and others for consumer electronics products such as digital cameras, audio recorders, cellular phones, and personal digital assistants.

SCM Microsystems will provide specialized, full-size PC Card slots and corresponding PC Cards designed as readers for the Miniature Cards. "We'll announce a minireader, which is a full-size PC Card with a hole where you can insert a Miniature Card so that data can be exchanged between hand-held devices and PCs," says Nicholas Efthymiou, vice president of SCM Microsystems. Efthymiou foresees personal digital assistants as incorporating the Miniature Cards in a key market in which the cards will be shared with notebook and desktop PCs. In the short run, however, digital cameras seem likely to be the

biggest market for Miniature Cards. Cellular phones also look promising, for those who want to archive their voice mail.

The first Miniature Cards are likely to arrive from AMD and Intel by summer. These flash-based storage cards, designed to store 4MB to 8MB of data, will probably show up first in digital cameras, although Efthymiou says some notebook and desktop PC manufacturers are already looking at building Miniature Card slots into their products.

Naturally, the cards are expected to take on more advanced capabilities over time. "Later, the cards may be adapted to accommodate DRAM or ROM," says Efthymiou. "The Miniature Card standard defines up to 64MB of storage, and I envision future minicards in that capacity range." —Sebastian Rupley



TAKE IT WITH YOU: The Miniature Card can store 4MB of data.

Top CD-ROMs

- 1 Microsoft Windows 95 Upgrade Microsoft
- 2 Quicken CD-ROM Deluxe Intuit
- 3 TurboTax Deluxe Intuit
- 4 Myst Broderbund Software
- 5 Print House for Windows 95 Corel
- 6 Microsoft Encarta '96 Microsoft
- 7 Rebel Assault II LucasArts Entertainment
- 8 Warcraft II: Tides of Darkness Blizzard Entertainment
- 9 Microsoft Plus! Microsoft
- 10 MechWarrior 2 Activision

Source: PC Data. Data for January. Additional lists are available at <http://www.zd.com/pcmag/topiten/topiten.html>

By Jake Kirchner

Buying Retail: It Takes Two to Make an Honest Deal

They stopped just short of calling me a knucklehead—at least most of them.

The “they” in this instance were the many thoughtful *PC Magazine* readers who reacted with considerable interest to my recent Pipeline on mail-order purchases of PC hardware and software.

In that column (February 6, 1996), I described my predilection for buying direct. I’m afraid my description of retail computer establishments struck some readers as, shall we say, slightly less than flattering. Many in that trade—it seemed like *most*—sent me long and passionate counterarguments. A few sent me very short and to-the-point e-mails that I can’t quote in a family magazine.

Regardless of the semantic diversity of those letters, the writers invariably opened with a friendly “Dear Jake, You don’t know anything,” before launching into detailed perorations on one of two different points—and, in some cases, both. First, they argued that direct shopping is safe only for commodity items (their assumption being that PCs are not yet in that category). Second, they contended that mail-order buyers are low-life connivers out to shave off a few bucks from their purchase prices by taking unfair advantage of retailers.

On the first point, I can only continue to disagree respectfully. My direct-buying preference is based on my belief that for experienced computer users, hardware and software are indeed commodity-like items. They aren’t pork bellies or orange juice, and products within a category often have significantly different features. But buying them mail order is no more difficult or risky than buying other mass-produced items—such as car stereos, televisions, furniture, clothes,



The rules of mail-order etiquette are more important to more shoppers than ever before.

sports equipment, or luggage—through catalogs.

But the second point brought me up short, because it was an argument I had not considered. As one correspondent put it: “Millions of people buy direct, then go to the retailer for hand-holding and information. Many of these people visit the retailer first for advice and demonstrations, then buy direct to save money.”

My first inclination was to point out that getting a buyer into a store—even someone planning to buy direct—is at least an opportunity for a retailer to try to make a sale. Yet I readily agree that anyone who buys a PC direct and then tries to get free advice and service from a retailer is pretty contemptible. So I’m proposing two rules of etiquette for mail-order buying:

1. If you buy from a mail-order vendor, you really are obliged to suffer through your vendor’s telephone-based support, or lack of it. It comes under the heading of lying in the bed you made. Now, if you’re willing to pay for follow-up support from a retailer, you’ll be welcomed with open arms in many retail establishments.

2. For comparison shopping, keep your forays brief if you have no intention of buying from a retailer. Don’t waste a salesperson’s time, but feel free to engage in lengthy discussion and negotiation if you’re willing to declare your intentions. Tell that person, “I’m thinking of buying direct,” and let him or her decide how much time to spend trying to change your mind.

These rules become more important as PCs become commodities to more and more shoppers. Simply put, they can be summed up this way: If it takes two people to make a deal, then it takes two honest people to make an honest deal.

Beating the Markets—While Fly Fishing?

Getting bull and bear calls from your PC.

Imagine this: After a wide-eyed look at your completed tax return, you turn on your PC and an intelligent agent with a track record of investing at a return rate of 30 percent a year pops up, analyzes your entire portfolio, then delivers a set of recommendations based on today’s trading. Sound exciting? Financial software for the PC isn’t quite there yet, but it’s getting closer.

High-end products designed for technical analysis have formed a niche market. But the investment analysis that the average PC serves up may soon become a lot more

sophisticated—even automated.

Reuters recently acquired Equis’s MetaStock market-charting and -analysis software, which is targeted to extend Reuters’ popular Money Network product into high-end market-analysis territory. And Omega Research, maker of SuperCharts technical-analysis software, recently struck a deal allowing Dow Jones to provide Omega’s PC-based market-charting and -analysis software to investors. Omega’s and Equis’s products are both used by world-class traders to track the relationships of markets to technical indi-

cators such as relative volatility.

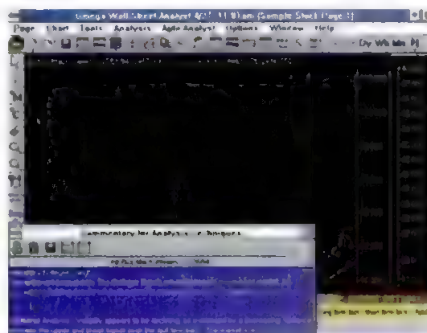
For an upcoming release of Omega’s SuperCharts, author and trader Larry Williams has contributed his own rules for an expert

hear an audio-based analysis from Williams of the trend for any security that day.

Can constantly changing markets benefit from expert-system-

based analysis techniques? “History is the best guide to how a trade will perform,” says Williams, “and the software you can get for a PC is now powerful enough to help you exploit non-random price movements.” Williams says he trades on fishing trips, using a laptop and a cellular phone.

A release of SuperCharts, including the expert system and Reuters’ Money Network with MetaStock, will be available by summer.—*Sebastian Rupley*



CALLING THE CRASH: Omega Research’s investment software uses an expert system to call the market.

system designed to make daily market calls. The expert system will include a database of .WAV files so that you can automatically

It does more. But this is a one page ad.

Pilot™ is your automatic link to the personal info on your PC.

Pilot includes its own Personal Information Manager software that lets you edit, import and export info to and from your PC.

Pilot stores thousands of addresses, phone and fax numbers, personal notes — you name it.

Touch here to see the day's agenda. Make recurring meetings appear automatically.

Pilot's PIM works with desktop PIMs like Sidekick, Schedule+, Now Up-to-Date and others.

Delete old records from your Pilot, and keep for future reference in an archive file on your PC.

Enter any word and touch "Find" to retrieve a stored item instantly.

It's easy to add memory, upgrade, or attach products like modems and pagers.

Prepare a To-Do list, prioritizing items by due date. Make items disappear as you complete them.

Take notes on the road, then later drag and drop them into programs like Word or Excel on your PC.

Enter data once into your Pilot or PC. Then press the HotSync™ button to keep your Pilot and PC up-to-date.

One touch automatically keeps the data on your Pilot safe and backed up on your PC.



At about 4.5" tall, 5.5 oz. and at \$299*, the new Pilot organizer fits your shirt pocket—and your budget. Yet it's huge on functionality. But instead of telling you all it can

pilot
The one touch organizer

do, we think you'd rather try it out yourself. To find out where to get your hands on one, give us a call at 1-800-881-7256. To arrange a demo, visit our web site at <http://www.usr.com/palm>.

*The average U.S. street price for P101 complete with all desktop PIM software and organizer software, docking cradle and accessories. © 1996 U.S. Robotics, Inc. U.S. Robotics and the U.S. Robotics logo are registered trademarks and Pilot and HotSync are trademarks of U.S. Robotics, Inc. and its subsidiaries. All other product names are registered trademarks or trademarks of their respective owners.

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The Intelligent Choice in Information Access

First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

WEB-PAGE EDITORS

AOL, CompuServe, and Prodigy Tools Let You Create a Web Presence

By Edward Mendelson

The race to the Internet's World Wide Web has become a gold rush, and the fastest and easiest way to stake your claim is by creating your own home page through one of the major online services. Until recently, America Online (AOL), CompuServe, and Prodigy did their best to ignore the Web's potential, but today they provide their subscribers several ways to create and maintain personal home pages that are accessible to anyone with Internet access—not just the services' subscribers.

Not only do the Big Three online services provide the software to create Hypertext Markup Language (HTML) pages, but each offers server space to house your Web presence. *PC Magazine* tested these personal Web-page generators and found widely varying levels of functionality, automation, convenience, and cost. If you are eager to experience your

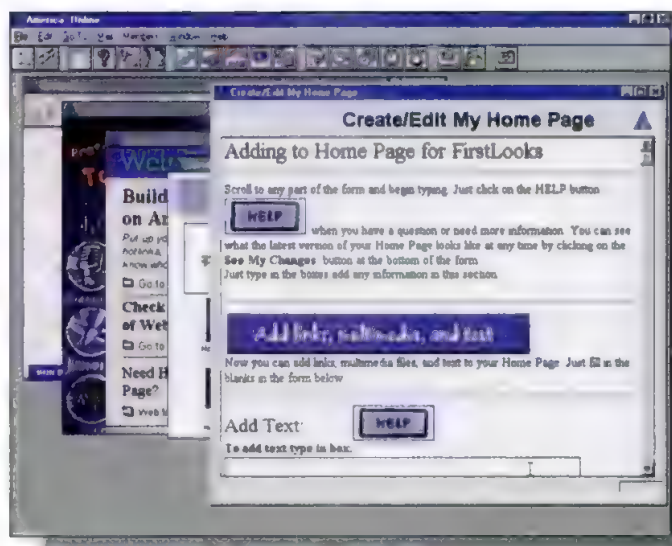
15 megabytes of fame, the reviews that follow may help you decide whether or not to stick with your current online service.

AMERICA ONLINE

America Online gives its subscribers the choice of two different services for creating home pages: My Home Page is for beginners, while My Place is for Web aficionados.

My Home Page lets you fill in the blanks on a form to create a single page in a rigidly defined format. Subscribers are allowed up to five free screen names of up to 2MB each per account.

To access My Home Page, log
Continues on page 40



FILL IN THE BLANKS: America Online's My Home Page service lets you create a simple Web page by filling in a form. This method sacrifices flexibility and creativity for ease of use and speed.

SERVERS

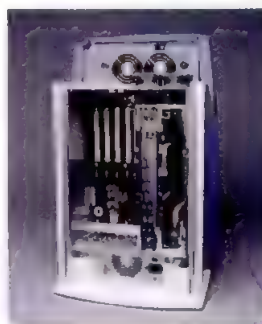
Panda's Archistrat 4s Looks to the Future Of Networked Computing

By Robert W. Kane

With the relentless advance of computer technology, you would think that by this point systems—especially servers—that are easily upgradeable and expandable would be commonplace. But with BIOS revisions, incompatibilities, and changing I/O architectures, an easy upgrade path remains an elusive goal. The Panda Project, launched three years ago by several ex-IBM employees, hopes to change all that beginning with the \$27,000 Archistrat 4s server, which boasts a new connector designed to make entire system upgrades as easy as swapping cards.

The idea behind the Archistrat (the name is an amalgam of ar-

chitecture, orchestration, and strategy) is not entirely new. Several years ago, Compaq introduced a Deskpro M line with interchangeable CPU and bus cards, hoping the up-



BREAKING THE MOLD: The Archistrat's unusual exterior conceals the server's equally novel system architecture.



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First Looks

Web-Page Editors

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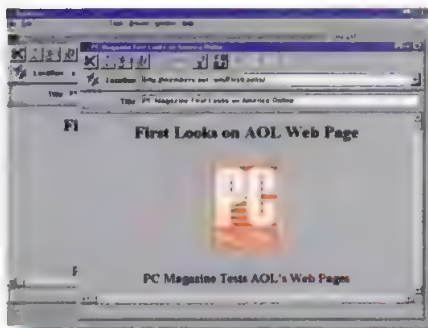
on to AOL and use the keyword HTML. To build your page, you fill in a form that lets you add text, graphics, and links. The text editor is a tiny window that's so primitive that it doesn't wrap words at the end of a line, although we found that the words wrapped properly when displayed in a browser. When you want to add additional text blocks or links, they are inserted after the text and links you created earlier.

My Home Page is not nearly as flexible as it should be. For example, if you want to change the order of your text blocks and links, you have to delete the earlier ones, insert the new ones, and then retype the earlier ones. After each change, you have to view the change and then return to the editing form—a painfully tedious process.

You upload graphics to AOL's server from your hard disk by following a laconic set of prompts. Links can include a visitor-counter provided by AOL as well as a prompt that opens a "mailto" window for others to send mail to your AOL e-mail address.

Near the top of the page is a list of personal information, including entries for marital status, interests, and other items. You can leave individual fields blank, but you can't remove the list of fields, and your page will display "no response" next to those left blank. You can also specify whether your page will be visible only to you, only to other AOL members, or to the world at large via the Internet and AOL.

Many beginners will be happy to be able to create a Web page during their first session, but the page-editing procedure is awkward and time-consuming, and



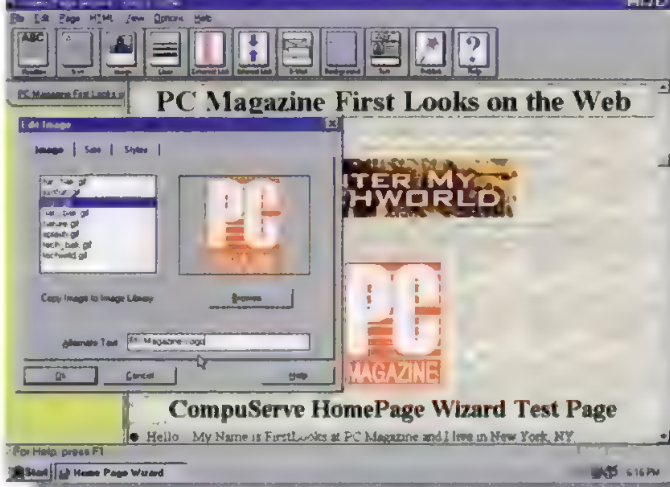
BROWSER: NaviPress 1.1, the HTML editor available from America Online, includes a built-in Web browser.

therefore costly because you can only modify your pages while you are online.

AOL's more complex My Place service lets you create Web pages off-line using any HTML

anonymous FTP site, with any files and directories that you create available to anyone who knows your screen names; the files in your Private directory can't be accessed by others. Visitors can upload files to your site if you create an /incoming directory.

Although you can use any HTML editor to create Web pages with My Place, AOL steers you to NaviSoft's editing software, NaviPress 1.1; you can use the software for 30 days at no charge. To continue, you have to sign up for NaviSoft's home-page service on the Web, which is en-



GRAPHICAL INTERFACE: CompuServe's Home Page Wizard creates Web pages without offering even a glimpse of HTML code.

editor. You maintain your Web site with an online utility that lets you upload, delete, or rename files. The process forces you to cycle through My Place's menus repeatedly for each file you upload. You can create subdirectories on your site, but you'll need to be well versed in Unix commands to do so.

Your Web site doubles as an

tirely separate from AOL.

NaviPress is a powerful but slightly clumsy HTML editor that includes a built-in browser. You edit pages in WYSIWYG mode, optionally cutting and pasting from a browser window into an editing window. Alternatively, you can edit a remote file in your browser window and then save the file to your hard disk. An optional window lets you work with raw HTML files, but your changes aren't displayed in the WYSIWYG window until you switch back to it.

Surprisingly, NaviPress isn't integrated with AOL's software. This means that you can't use

NaviPress to browse the Web while online with AOL; you'll need a separate dial-in or network connection to a different Internet service provider. NaviPress also lets you create pages using up-to-date HTML features that can be viewed in Netscape Navigator or Microsoft's Internet Assistant, but these items won't display in AOL's Web browser.

Subscribers to AOL have access to a generous supply of disk space for their home pages, along with a wide range of features. But they must choose between the simplicity and integration of My Home Page and the far more powerful standalone NaviPress editor in My Place.

America Online My Home Page or My Place. Requires: 4MB RAM, 6MB hard disk space, America Online for Windows Version 2.5, Microsoft Windows 3.1 or later or Windows 95. America Online Inc., Vienna, VA; 800-827-6364, 703-448-8700. Circle 480 on reader service card.

COMPU SERVE

CompuServe lets its subscribers create visually spectacular Web sites without requiring them to know anything about HTML, reduces connection charges to an absolute minimum, and automatically uploads your Web site's files to CompuServe's server. The Web-page editing software provided by CompuServe OurWorld is easier to use than anything else available.

You get 1MB of hard disk space at no extra charge, but that's the limit, even if you're willing to pay for more. CompuServe plans to offer more extensive Web-site features for business use in the future.

You start by connecting to CompuServe with WinCIM, and then you visit the HPWIZ forum. From there you can download the Home Page Wizard, which you install on your hard disk.

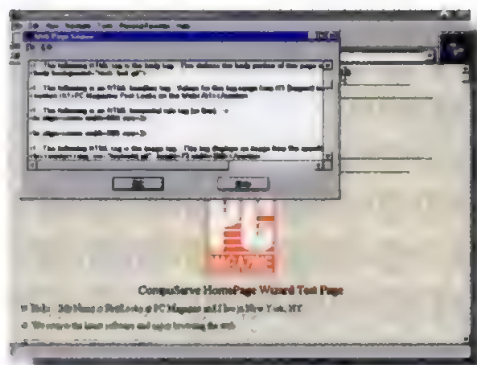
Creating a Web presence on CompuServe is a two-step process. Start with the Home Page Wizard, which helps you create a home page or a full set of interconnected pages, complete



Go online to discuss the personal Web-page utilities from AOL, CompuServe, and Prodigy with Edward Mendelson, a contributing editor of PC Magazine, and guests from each service.

- On AOL, type ZDNET and go to Mingle for a live chat on April 11 at 8:00 P.M. eastern time.
- On CompuServe, type GO EDITOR between April 8 and April 12.
- On Prodigy, type JUMP PC MAGAZINE for a live chat on April 9 at 8:00 P.M. eastern time.

First Looks



MARKUP: HTML pages created by CompuServe's Home Page Wizard are heavily commented, as seen here in CompuServe's Web browser.

with support for graphics backgrounds and sample images. Then the Publishing Wizard gathers all the files together and automatically uploads them to the service. These tightly integrated programs shield you from HTML codes and the tedious file management procedures required by AOL and Prodigy.

You work with *projects*, or collections of pages, that together form your complete Web site. Graphics, lines, and text are inserted in individual pages either by typing directly in the editor window or by dragging icons from a toolbar, and you can move text or other page elements simply by dragging them.

The help file warns you that you can't import HTML pages from outside the program. HTML features such as graphics backgrounds and "mailto" fields are supported, but the software can't create tables or forms. Until you're ready to upload the files to the CompuServe Web server, all the pages the software creates remain in a proprietary format.

The Publishing Wizard provides a step-by-step sequence for moving your files to CompuServe. The program knows which pages and images you included when you created your pages but gives you the option of adding other files. The wizard then dials into CompuServe and uploads the files automatically. The first time you run the Publishing Wizard, you can choose a user name such as "Mary_Jones" instead of your

CompuServe account number.

You can delete all files on your site at once, but the software won't let you delete individual files. If you want to include HTML features not supported by the editor, you can use any third-party HTML editor and then use the Publishing Wizard to

upload the revised files, but the next time you open the editor, it will display only the versions that were originally created in the editor.

We suggest you look into Hpmann, a \$17 shareware editor by Heinz Ableggen that replaces the Home Page Wizard. Available in CompuServe's INETPUB forum, this program lets you work directly with ordinary HTML codes but organizes files in the same kind of "projects" created by CompuServe's editor.

CompuServe OurWorld does not give you as much disk space as the other services, yet its automation and economy are unmatched. Despite the limitations of the editing software, this is the best implementation of a home-

Columbus, OH; 800-524-3388, ext. 664; 614-457-8600. **Circle 481 on reader service card.**

PRODIGY

Hidden behind Prodigy's dreary interface is an online service that tries hard to be friendly. Unfortunately, only the least friendly parts of Personal Web Pages were operating during our testing.

Prodigy allots subscribers 1MB of free Web-site disk space; an extra 2MB, 5MB, 10MB, or 15MB can be had for a monthly rental price of \$1 per megabyte. You create pages offline using any HTML editor and then upload them using a File Manager-style utility.

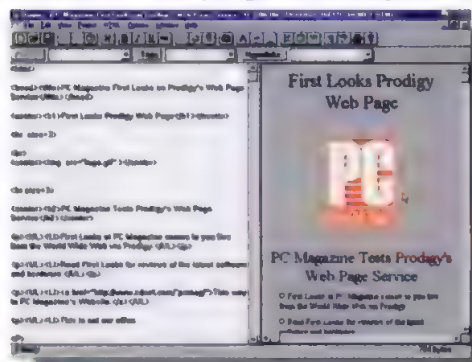
The opening screen for Personal Web Pages contains a link to launch the utility that manages files on your Web page.

Another link leads to a Web page from which you can download Trout Software's Hippie, a shareware HTML editor that supports basic HTML features in the downloadable version. You'll want to pay the \$29.95 to register Hippie and get support for advanced features, such as tables.

Hippie displays your HTML pages in a two-pane window: One pane is for editing text and HTML codes, while the other displays the file as it will appear in a browser. This unique real-time display lets you spot errors without testing the file in a browser. One annoying limitation is that you have to scroll the browser-style window by hand to make it display the same part of the file in the editing window.

The utility that maintains files

on your Web site makes file management easy. A list of files in a directory on your hard disk appears on the left, and a list of files on your Web site appears on the right. You simply highlight files for uploading, downloading, deleting, or renaming, and the utility does the rest. This utility won't create subdirectories on your Web site. Like AOL, Prodigy gives you a simple address for your Web page, less onerous than the complex address that you get from CompuServe.



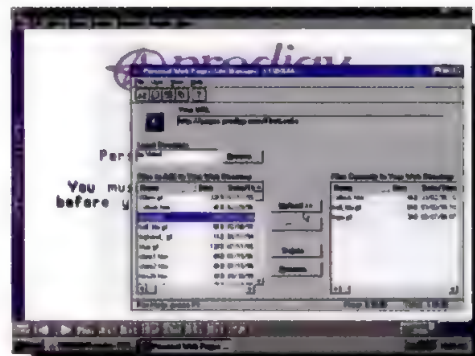
REAL TIME: Prodigy's HTML editor, Hippie, updates its browser view as you edit in the code window.

HTML Scratchpad, Prodigy's online software that lets you fill in the blanks to create a Web page, had been withdrawn for upgrades during our testing. The forthcoming upgrade, which should be available by the time this issue appears in print, will include templates that let you build just about any standard HTML feature—including Virtual Reality Markup Language (VRML).

Don't expect support for the extensions to HTML provided by Netscape and Microsoft. Prodigy's built-in Web browser remains relatively slow and primitive.

If you're already committed to Prodigy, you'll find everything you need to create your own Web persona, but Prodigy's slow performance and primitive interface detract from an otherwise solid implementation.

Personal Web Pages. Requires: 4MB RAM, 4MB hard disk space, Microsoft Windows 3.1 or later or Windows 95. Prodigy Services Co., White Plains, NY; 800-776-3449. **Circle 482 on reader service card.**



UPLOAD: Prodigy's Web-site manager software transfers files between your hard disk and your Web site.

page service available in today's marketplace.

CompuServe OurWorld. Requires: 4MB RAM, 8MB hard disk space, Microsoft Windows 3.1 or later or Windows 95. CompuServe Inc.,

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\$2250



Think of it as a supercomputer with a touchpad.

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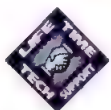
As one of the most complete, most powerful, feature-rich, multimedia notebooks available today, this small but mighty powerhouse is fully optimized for 75 to 120 MHz Pentium® processors and will blow the lid off other notebooks. There's a 256KB external level II



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CIRCLE 235 ON READER SERVICE CARD

First Looks

Archistrat 4s

Continued from page 39

grade craze would catch on. Although Compaq did deliver a few CPU upgrade boards, ultimately the high cost and limited options for upgrades killed the concept.

bus. Four of the PCI slots ride on a secondary PCI bus, resulting in decreased performance. More to the point, PCI is the assumed I/O bus for all Archistrat 4s upgrades for the foreseeable future, so regardless of how you upgrade the system, the PCI

port, and mouse, keyboard, and video connectors.

There is also an Adaptec 7870 SCSI interface card connected to the Archistrat 4s's removable storage devices, which are concealed behind a motorized front panel. Press a button on the top of the

tium/133-based Compaq ProLiant 1500 5/133 but eventually overtook it at a client load of 32 workstations.

In view of the fact that it offered only marginal performance gains and slightly more data storage space over the \$17,599 ProLiant, the Archistrat 4s seems expensive, especially when you compare the features of the two systems. The ProLiant has hot-swappable drives, predictive hard-disk failure analysis, SmartStart setup and management software, and a rack-mounting option—all features that are not offered on the Archistrat 4s.

If your servers have high visibility, though, the Archistrat 4s has the physical appearance and eye-catching appeal of R2-D2. And it comes in a full palette of colors, from so-called Panda-white-and-cappuccino to black, ruby, sapphire, teal, and terracotta. In this respect, the Archistrat 4s seems to be based as much on form as on function.

Panda Project officials claim the primary reason for buying an Archistrat 4s is not for peak performance but for the ability to keep your system at the optimal performance level the market has to offer over the lifetime of the computer. To that end, they have arranged special lease deals with automatic upgrades.

If the objective of the Archistrat 4s was to deliver a file server whose CPU and chip-set components could be easily upgraded, then this server has unquestionably hit its mark, especially if Panda can provide the Digital Alpha and quad Pentium Pro processor boards. As a showcase for Compass technology, the Archistrat 4s is also a success. As an enterprise server, it is still a few pieces short.

Archistrat 4s. List price: With Pentium/166 CPU, 512K external cache, 128MB RAM, five 2GB Fast/Wide SCSI hard disks, 4-mm SCSI tape drive, 4X CD-ROM drive, \$27,000. Panda Project, Boca Raton, FL; 800-566-6987, 407-994-2300; fax, 407-994-0191. Circle 416 on reader service card.

BENCHMARK TESTS



Archistrat 4s

On our test suite, NetBench 4.0, the Archistrat 4s was competitive with the fastest servers in our roundup of March 26, 1996. The Compaq ProLiant 1500 5/133 exhibited the best peak performance, but as the workload increased beyond 32 clients, the Archistrat 4s had greater throughput, with a peak of 35 Mbps.

We measured performance under Microsoft Windows NT Server 3.51. Each server was connected to a 60-node network using Fast Ethernet 100Base-TX. Both systems had 128MB of RAM and 512K of external cache. The Archistrat 4s and ProLiant had Pentium/166 and Pentium/133 CPUs, respectively. The Archistrat 4s's five 2GB Fast/Wide SCSI hard disks were configured using a RAID 5 array and Mylex DAC960PD controller, while the ProLiant's four 2GB Fast/Wide hard disks were striped (RAID 0) into one logical volume.

The Archistrat 4s breaks new ground with a novel connector technology called Compass. The connector for all system components on the Archistrat 4s's passive backplane, Compass has 132 contacts per inch. The processor, chip set, and memory all piggy-back on the 256-bit-wide Compass bus, which is connected to six 64-bit PCI and six ISA slots.

Thanks to Compass, the Archistrat 4s is the first server we've seen that can switch from an Intel x86 CPU to a Digital Alpha by just swapping a board. That is, if Panda Project engineers deliver on their promise of a working Alpha board.

Although the Compass connector is keyed so that you can't put a board in backward, we did damage the connector on a memory board while trying to reinstall the board. An engineering fix is promised to reduce the likelihood of such an event.

Another unique feature of the Archistrat 4s is that it's the first server to use a 64-bit PCI

pieces remain in place.

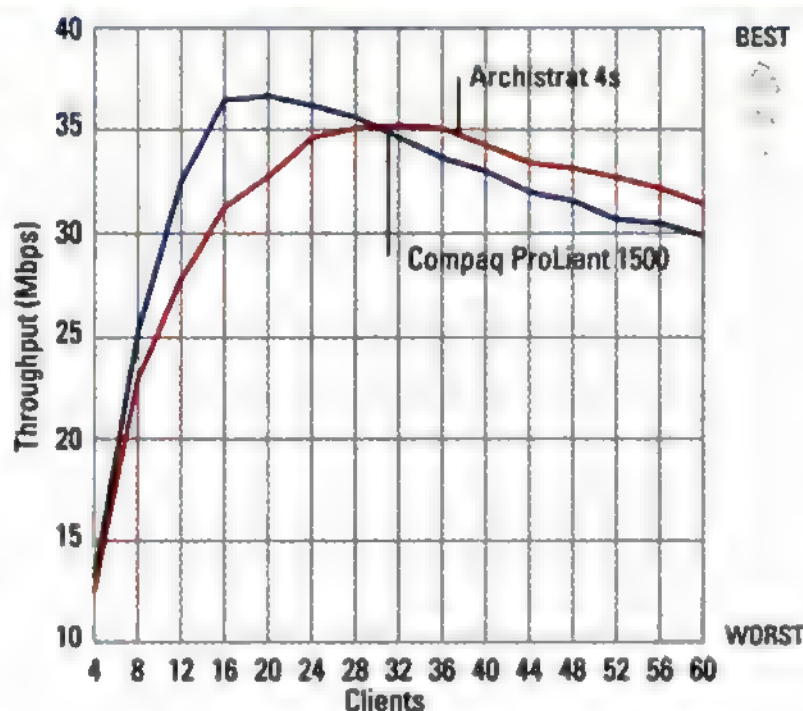
The Archistrat 4s we received for evaluation came with a 133-MHz Pentium CPU, but we immediately upgraded it to a Pentium/166 by swapping the CPU and bridge board, which contains the logic chip set. Indeed, we found this process effortless.

In part because of cost concerns and also because future CPUs may run at speeds in excess of 300 MHz, the

Archistrat 4s has only an FCC class A certification. This is fine for the application-server market but will exclude the unit from certain government installations, which require the more stringent class B certification.

Once you get beyond the connectors, the technology employed by the Archistrat 4s is straight out of the Intel parts book. The 166-MHz Pentium CPU, 512K of external cache, and Nep-

tune chip set on the bridge board formed the core of our review unit. The bridge board also carries two serial ports, one parallel



From April 15 to 19, go online to discuss the Panda Project's Archistrat 4s server with Panda's Jay Starrett and Bob Kane, director of ZD Labs. Type GO EDITOR on CompuServe.

server and the panel pops out and down in front of the case. Press the button again and the door rises and slides back into place, giving the server a clean, sleek look.

Inside, the drive bays are arranged like the steps on a staircase and are occupied by a 3.5-inch floppy disk drive, a 4X CD-ROM drive, and a 4GB 4-mm SCSI tape drive. An empty half-height 5.25-inch drive bay could house a boot hard disk.

There's room inside for an additional 10 or 12 hard disks, which can run off an optional PCI-based RAID controller. Our test unit came configured with the Mylex DAC960PD controller with 4MB of disk cache and five Fast/Wide SCSI Seagate Barracuda 2GB hard disks. The test system contained two Cogent 100Base-T Ethernet network interface adapters, which were also attached to the PCI bus.

FORM VS. FUNCTION

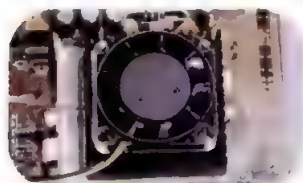
The Archistrat 4s performed on a par with the best systems from our recent file-server roundup ("Server Power," March 26, 1996) running Windows NT 3.51. On our tests, the Archistrat 4s initially lagged behind the Pen-

PCs

The Pentium Slayer? Sys Technology's C166+ PC Delivers Pacesetting Performance

By Cade Metz

Although its Cyrix 6x86 P166+ processor has a clock speed of 133 MHz, the Sys Performance C166+, a \$2,945 mini-tower system, lives up to its name by outperforming most of the Pentium/166 machines on the market. On our tests, it not only



A LOT FOR A LITTLE: The Sys Performance C166+ offers 512K of L2 cache, a 1.2GB hard disk, a swift graphics card, and a 6.7X internal CD-ROM drive.

bested the SAG STF 166, our Editors' Choice among Pentium/166 machines in our recent roundup, but also delivered the highest Winstone 96 and Graphics WinMark 96 scores of any PC.

NAME GAME

Following Cyrix's lead, Sys Technology is naming its 6x86 machines according to the newly developed P-rating system for non-Intel processors. Under this scheme, a P166 would perform on a par with a 166-MHz Pentium chip. Vendors may also add a "+" suffix if the CPU outperforms its Pentium counterpart, though this convention is not part of the standard P-rating system.

Instead of pushing the clock speed, Cyrix has squeezed the most performance out of its processor, which is produced on a 0.6-micron process. The P166+ uses many of the design enhancements incorporated in Intel's Pentium Pro chip: a superscalar design, superpipelining, register renaming, multibranch predic-

tion, and out-of-order execution.

Building on this highly capable processor, Sys Technology has designed a full-featured system. The C166+ is equipped with 16MB of EDO RAM, 512K of pipelined-burst external cache, a Quantum 1.2GB EIDE hard disk, and a Matrox MGA Millennium graphics card with

bay. There are no available internal drive bays. The C166+ can accommodate only one ISA card and two PCI cards.

Despite its clock speed, the 6x86-based P166+ was able to deliver astonishing scores on our Windows-based benchmark tests.

The C166+ notched a

Winstone score of 80 and a Graphics WinMark score of 36.6 million pixels per second, which easily bested the average Winstone and Graphics WinMark scores of 68 and 25.0, respectively, for the 23 Pentium/166 systems in our recent roundup ("The Powers That Be,"

February 20, 1996).

In fact, the C166+ even beat the performance leader from that group, the SAG STF, which produced a Winstone score of 76 and a Graphics WinMark score of 32.3 million pixels per second.

On our Disk WinMark 96 tests, the C166+ delivered an even 1,200, which was just under the SAG STF's 1,220 but still well above the average Pentium/166 score of 1,100. The C166+ did not fare as well, however, on our 16- and 32-bit processor benchmark

tests. The C166+ yielded scores of 299 and 305 on our CPUmark₁₆ and CPUmark₃₂ tests, respectively—better scores than the average results for Pentium/133 systems (266 and 267; "In like a Lion..." December 5, 1995) but a bit less than the averages for Pentium/166 PCs (310 and 309).

DOLLAR FOR DOLLAR

There's also a C150+ model based on the 120-MHz Cyrix 6x86 that delivers the performance roughly of a Pentium/150, but the company does not have a motherboard that will accommodate Cyrix's 110-MHz 6x86 P133+.

The P166+ processor alone costs \$621, a price comparable to that of the Pentium/166 and not the Pentium/133. Nevertheless, the \$2,945 C166+ we tested is priced well below the SAG STF, which has a street price of \$4,590. The price of the C166+ was competitive even with those of the least expensive Pentium/166 machines in our last Pentium/166 roundup.

If you are running Windows 95 and don't need the 32-bit optimized performance of the Pentium Pro, the Sys Performance C166+ will give you the best performance for your dollar—until the 180- and 200-MHz Pentium PCs hit the streets.

Sys Performance C166+. List price: With Cyrix 6x86 P166+ CPU, 16MB RAM, 512K external cache, 1.2GB hard disk, 6.7X CD-ROM, 15-inch monitor, \$2,945. Sys Technology, Cypress, CA; 800-613-9963, 714-821-3900; fax, 714-821-9592. Circle 439 on reader service card.

BENCHMARK TESTS



Sys Performance C166+

Don't let the clock speed of its Cyrix 6x86 processor fool you; the Sys Performance P166+ is the new PC to beat. On our ZD Winstone 96 and ZD Graphics WinMark 96 tests, the 6x86-based system outperformed even the fastest Pentium/166, the Editors' Choice-winning SAG STF 166. The C166+ garnered a Winstone score of 80 and a Graphics WinMark score of 36.6

million pixels per second, compared with scores of 76 and 32.3 million pixels per second for the SAG STF. On our Winstone tests, the C166+ was almost 18 percent faster than the average Pentium/166.

We tested the C166+ with 16MB of RAM, 512K of external cache, and a Matrox MGA Millennium graphics card under Windows 95.

Higher scores represent better performance.
Red type denotes first place.

	ZD Winstone 96	ZD Graphics WinMark 96 (Mpixels/sec)	ZD Disk WinMark 96	ZD CPUmark ₁₆	ZD CPUmark ₃₂
SAG STF 166 (Pentium/166)	76	32.3	1,220	334	339
Sys Performance C166+ (Cyrix 6x86 P166+)	80	36.6	1,200	299	305
Average Pentium/166 (Feb. 20, 1996)	68	25.0	1,110	310	309

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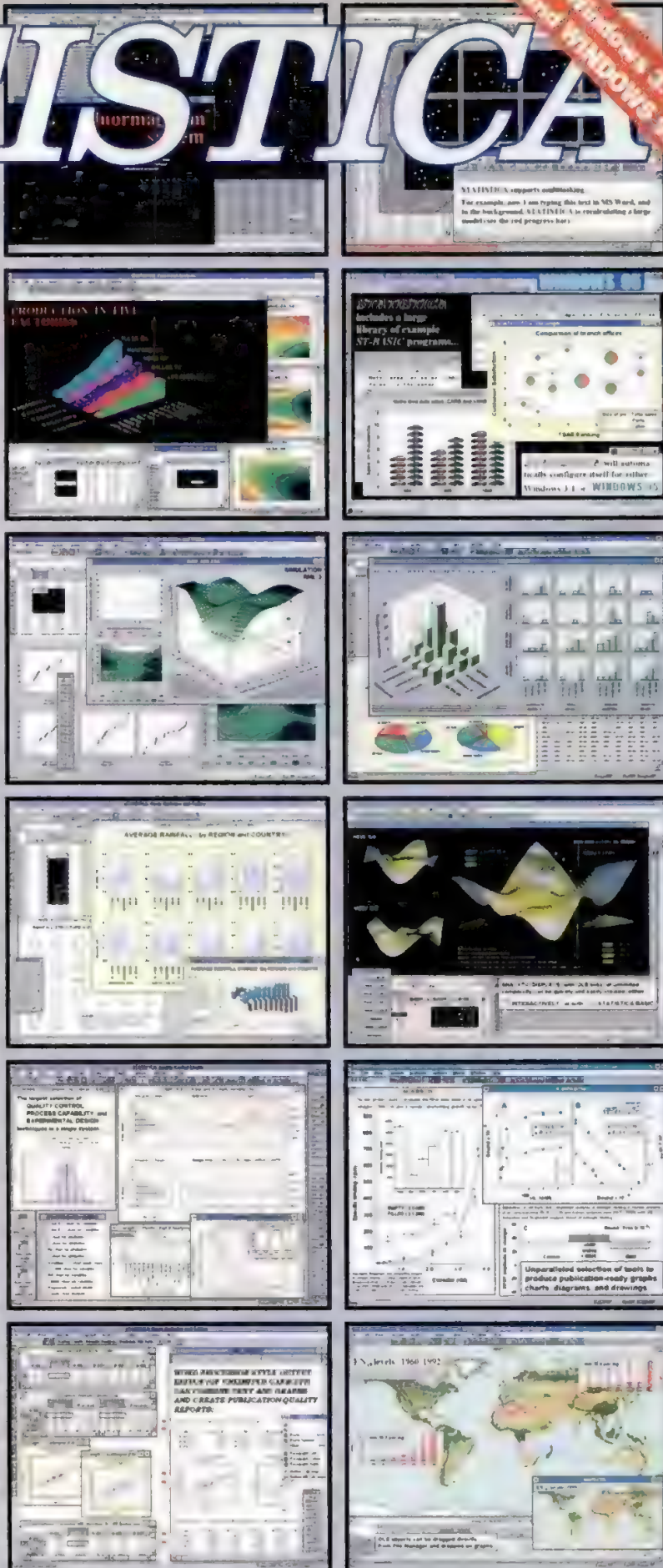
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First Looks

KEYBOARDS

Compaq's Scanner Keyboard Integrates Words and Images

By Melissa J. Perenson

You'd like to get a page scanner but lack the desktop space; where, you wonder, can you put another peripheral? Compaq Computer Corp.'s \$349 Compaq Scanner Keyboard is a one-stop desktop solution that integrates a sheet-fed page scanner into the upper extremity of a standard-issue Windows 95 keyboard.

Though large by keyboard standards, the Scanner Keyboard is surprisingly compact in view of all that it contains. Compaq uses the same mechanism that is used on Visioneer's popular PaperPort Vx scanner (First Looks, January 9, 1996). The Scanner Keyboard also utilizes Visioneer's PaperPort software as a desktop interface.

Although considered Plug and Play, the setup of the Scanner Keyboard can be quirky. Under Windows 3.1, setup went smoothly by simply connecting the Scanner Keyboard's Y-cable into the two appropriate ports (PS/2 port for the keyboard, serial port for the scanner), turning on the system, installing the software, and then calibrating the scanner with a white sheet of paper. Under Windows 95, you'll have to connect the scanner to the serial port after starting up Windows 95 but before installing the software; otherwise, Windows 95 will not detect the presence of the scanner. The Scanner Keyboard does not work under Windows NT.

The Scanner Keyboard produces digital images at anywhere from 200- to 400-dot-per-inch resolution and 256 shades of gray. You select the type of document you're scanning—such as an article, business card, letter, photograph, or snapshot—and the software automatically chooses the most appropriate resolution and bit depth. It took about 4 seconds to scan a letter-size document.

The presence of the scanner significantly enlarges the keyboard's

dimensions, particularly in terms of height (3.5 by 3.0 by 12.5 inches). The scanner has two raised bumps that act as paper guides; the maximum paper size is 8.5 by 30 inches, while the minimum size is 2 by 3 inches. The scanner's curved

hood routes originals according to its positioning. You can have documents spew out behind your keyboard in a straight paper path or have them curve upward back toward you and the keyboard.

Since you'd pay about the same price just for the PaperPort Vx alone, the Compaq Scanner Keyboard is a good deal.

Compaq Scanner Keyboard. Estimated street



NIGHT AND DAY: These two scans show the difference between scanning a document using the Scanner Keyboard's article setting (right) and the photograph setting (left). Note that the scan on the left is crisper and the photographs are clearly distinguished, but that you also get a grayish overcast when scanning in that mode.

price: \$349. Requires: PC with serial port and PS/2 mouse port. Compaq Computer Corp., Houston, TX; 800-345-1518; fax, 713-518-1442; <http://www.compaq.com>. Circle 417 on reader service card.

FINANCIAL SOFTWARE

Financial Analyst: The Textbook Answer to Practical Business Computation

By Mary Paulson

McGraw-Hill's Financial Analyst, a \$69.95 electronic version of the company's *Pocket Guide to Business Finance*, makes use of the MathCad engine developed by MathSoft to create an interactive program targeted at small-business owners, executives, managers, and accountants.

The heart of Financial Analyst is the more than 200 built-in calculations and formulas, ranging from simple ratios and cash-flow and profit-margin computations to complex regression analyses and statistical models.

Each of the program's tools is alphabetized, numbered, and cross-referenced for quick referral, and the included worksheets better illustrate the concepts set forth in the *Pocket Guide*. A paperback version of the book is also included with the package.

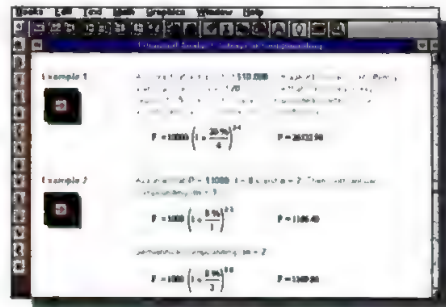
Another helpful feature of this program is the ability to make

notes in the margins, although the program will not allow you to change or delete any of the original text. All notes or math anno-

can't save or print the contents of your Scratchpad.

An extensive help file is augmented by pop-up help and context-sensitive help messages. Navigation buttons in the toolbar make it easy to search the Table of Contents and the Index or to use the hypertext links throughout the book to jump from section to section.

Business professionals will appreciate this simple and inexpensive guide to practical computation.



HIT THE BOOKS: Financial Analyst brings the math textbook into the 1990s to create a valuable business reference.

tations are displayed in a contrasting color so that you can keep track of your modifications.

For extended calculations, there's the MathCad Scratchpad. You can also copy, cut, paste, print, and save your changes in the electronic book, though you

McGraw-Hill's Financial Analyst. List price: \$69.95. Requires: 4MB RAM, 12MB hard disk space, Microsoft Windows 3.1 or later. McGraw-Hill Inc., New York, NY; 800-217-0059; <http://www.mcgraw-hill.com>. Circle 483 on reader service card.

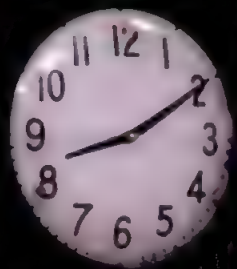
PO Talk

With Kate & Jack



PC Talk

With Kate & Jack



Kate: Rise and shine sleepy heads! It's time to drag your sorry tails out of the sack and boot up your PCs. You're locked into PCQA's "PC Talk with Kate and Jack." Your only source for the latest computer industry news.

Bob: That's right! We're ready to dive headfirst into some heavy-duty PC talk. But first I want to let all you computer gurus out there in on our little secret.

Kate: Jack! You blabbermouth — I thought we were going to keep a lid on it until the news! Bob, you're the controller. Keep your ears peeled for loose lips today!

Bob: Sure thing, Kate!

Bob: Sorry Kate — you know I can't keep a secret. Here's the scoop — we're fired up this morning because we're starting a new product review segment. We'll kick it off at approximately 10 a.m. when Chuck the delivery guy arrives with the black-and-white cow-spotted boxes.

Kate: OK, the cat's out of the bag! We're ready to talk speed! Meg from Maine, you're on!

Meg: Hey, Gateway 2000 created a real screamer when they took the fastest Pentium® processor on the market — the Intel 166MHz Pentium processor — and put it in their P5-166 Professional system.

Bob: You've got that right. Gateway has a reputation for ultra-speedy PCs. In fact, the February 1996 *Windows Sources* cover tagged a Gateway 2000 166MHz Pentium processor-based system as "the fastest Win 95 PC ever."

Meg: I believe it! We have a whole fleet of Gateway P5-166 Professional systems at my accounting firm.

Our clientele has doubled in less than two months because we're cranking through spreadsheets and crunching numbers like crazy. In a nutshell, productivity has skyrocketed, and that means my business is more profitable.



The P5-166 Professional system features 16MB EDO DRAM, 256K pipelined burst cache, 2GB hard drive, 6X CD-ROM drive and Microsoft® Office 95, Professional Edition for only \$2,899.



Bob: Where'd you get these mean machines, Meg?

Meg: Gateway 2000. Only \$2,899 a crack.

Bob: How can Gateway offer such a powerful system at that low price?

Meg: It's simple, Jack. Gateway knows how to cost effectively configure their systems for optimal performance. The combination of

16MB EDO performance DRAM and 256K pipelined burst cache in the Gateway P5-166 Professional system produces blazing speed that processes data by the truckload.

Bob: Why does this particular combination of memory and cache pack such a punch?

Meg: Pipelined burst cache and EDO DRAM speed up data delivery to the PC's processor. This reduces the bottleneck created when high-speed processors try to access data from slower conventional memory.

Bob: Amazing. And don't most Gateway PCs come with 16MB EDO performance DRAM?

Meg: Absolutely. They know what it's like to run 32-bit software apps like the ones in MS Office 95 with 16MB DRAM. It's like driving a Ferrari with a rocket booster.

Kate: Pop the clutch, Meg! Sydney from Seattle, you're on!

Sydney: What's all this hubbub about needing 16MB of memory? I thought 8MB was plenty.

Kate: Get with the program, Sydney! With 16MB of memory instead of 8MB you get a 25- to 30-percent performance increase. Al from Atlanta, you're on!

Al: Hey guys! Not only does Gateway 2000 build extra-fast PCs — they custom-build each system to your exact specifications.

Kate: Excellent point, Al. Gateway knows that cookie-cutter PCs don't meet the unique computing needs of their customers.



8 0 0 - 2 1 6 - 2 8 0 5



Kate: Boy, everyone's on a Gateway kick this morning. We must be sending out Gateway vibes!

[Blue Box]: C'mon Kate — our listeners are smart, and they're up to speed on the PC industry. We have another caller. Lenny from Los Angeles, you're on the air!

Lenny: Yeah, I'm looking for a computer for my family. I need Microsoft® Word to write about my travels through the Amazon. And my kids want a PC to play games and help them with their homework.

Kate: There are a lot of excellent home PCs out there. I'd recommend the souped-up version of the 166MHz Intel Pentium® processor-based system we talked about earlier. You need a PC loaded with all the goodies you can find, including a 6X CD-ROM drive for ultimate multimedia performance. Don't even think about a 4X IDE CD-ROM drive in a desktop PC. And you need a large selection of all the latest software versions.

Lenny: I just read about a computer like that in PC Magazine. They named the Gateway P5-166XL multimedia system Editor's Choice in their February 20, 1996, issue. I thought maybe it was just a lot of hype — but if you guys say that's what I need, I'm a believer! I have to call Gateway right now!

Kate: Smart choice. Whoa! The lines are lighting up. Let's see what Tex from Austin has to say.

Tex: Yeah, what's all this Gateway talk? Sounds to me like you're biased — big time!

[Blue Box]: Biased? Get off that jive, Tex. Ever heard of the First Amendment? We're just providing a forum so our listeners can make a knowledgeable decision when they purchase a computer.

Tex: Well ... I'm just playing devil's advocate.

[Blue Box]: Whatever. Go saddle up your horse or something. Next. Cole from Chicago you're on!

Cole: What was up with that yahoo?! Doesn't he know that Gateway is one of the few PC companies that provides true "personal computers." Each system is built to order at no extra cost — in fact you have over 15 million configuration options!



[Blue Box]: That's a boatload of options! Thanks for the math lesson!

Kate: We have a caller from America's heartland. Hal from Holstein, Iowa, you're on the air!

Hal: Mega power, Kate! I've been calling your show for years. I can't believe I actually got through.

Kate: Thanks Hal, what's on your mind?

Hal: I just bought my first Family PC™ multimedia system from Gateway. I was intimidated at first, but my sales rep, J.T., was very helpful. He helped me custom configure a P5-120 Family PC multimedia system, and he even took the time to tell me about MPEG data compression technology.

Kate: How about telling us what you know about MPEG?

Hal: Sure — MPEG stands for Moving Picture Experts Group, and it gives me awesome full-screen, full-motion video. J.T. explained how the 2MB DRAM graphics accelerator combined with video scaler, produces extra smooth video playback for MPEG multimedia applications. And with 2MB DRAM instead of 1MB, I get a whopping 16.1 million colors and a performance boost.

Kate: Today's technology is way cooler than I ever dreamed it could be. Happy computing in Holstein! Hey, that reminds me — where's the delivery guy?

[Blue Box]: No sign yet. Dick from Detroit, you're on!

Dick: What are you — a Gateway pep squad? I've heard it takes forever to get through to their tech support.



Jack: OK Dick — let's set the record straight. Gateway had a few growing pains awhile back, but last year they beefed up their service with Gateway Gold™ service and support. It features 24-hour-a-day toll-free technical support, seven days a week; free

Phil: When I decided to go with the Intel Pentium Pro, I couldn't afford not to get the Gateway G6-200. It's specially configured for ultra-high performance. The G6-200 flies through intense applications, and with the Matrox® 4MB WRAM graphics



software technical support for all Gateway-provided operating systems and application software, plus much more.

Dick: You win. I'll give them a call.

Jack: We're so good! Dee from Denver, you're on!

Dee: I'm just getting into this computer stuff. I want a PC so I can get on the Net and the Web. Any recommendations?

Jack: An ideal Internet computer for beginners is a Gateway P5-100 Family PC system with 8MB EDO Performance DRAM, a large hard drive, sound capabilities, a 6X CD-ROM drive and a 28.8 fax/modem.



The P5-166XL multimedia PC features 16MB EDO DRAM, 2GB hard drive, 16-bit sound card, speakers w/ subwoofer & 28.8 fax/modem for only \$3,799.

Dee: Do I really need a 28.8 fax/modem?

Jack: Absolutely. You don't want to use yesterday's technology to cruise today's graphic-intensive Internet content.

Dee: OK, you've convinced me, but I'm still a little nervous.

Jack: Relax. When you buy a Gateway multimedia PC you get a TelePath® 28.8 fax/modem along with the Gateway Info Highway CD. It has an easy-to-use tutorial of included trial memberships to CompuServe®, Prodigy®, America Online® and Reuters Money Network, plus you get Global Network Navigator for Internet browsing. It's everything you need and more. Don't forget to check out Gateway's Web site at <http://www.gw2k.com!> Phil from Fresno, you're on!

Phil: Man, that Intel Pentium Pro processor pumps out the raw power I need for my graphics and design applications. Now my work is done by mid-afternoon, and I have time to hit the links.

accelerator, I get fantastic graphics performance and 3-D hardware support with more colors.

Kate: And remember the Gateway G6-150 is now only \$3,199! Marge from Minneapolis is up next, and she's ready to talk MS Windows NT.™

Marge: I haven't heard a lot on your show about Windows NT. It's the only way to go for business apps.

Kate: How's that, Marge?

Marge: We use Windows NT 3.51 at my engineering firm, because it's a powerful 32-bit operating system that efficiently processes our data-intensive applications like those in MS Office 95, Professional Edition.

Kate: Where do you get this ultra-efficient operating system?

Marge: We get all our PCs from Gateway 2000. They preload Windows NT Workstation on our systems and configure the needed drivers for compatibility with Gateway hardware and software.

Kate: Aren't all Gateway PCs loaded with MS Windows® 95?

Marge: Not anymore. Customers have a choice of Windows NT or Windows 95 on their G6 systems, and Windows NT is available as an upgrade for only \$99 on all Pentium processor-based PCs.

Kate: Thanks for the Windows NT lesson, Marge! And don't forget Windows for Workgroups 3.11 is also available on Gateway Pentium processor-based desktop and portable systems. This is some prize stuff, Jack! Our listeners are educating the masses on how to find the very best values on leading computer technology.



"You're not a fan of the business."

PC Talk

With Kate & Jack



Jack: I'm really pumped about this review segment. Bob, the controller, is even excited — he's keeping a sharp eye out for the delivery truck as we speak.

Bob: Jack! Kate! Cow-spotted box alert! Delivery truck at 2 o'clock and closing!

Kate: All right! Jack's headed for the door to greet Chuck.

Jack: Chuck! Buddy! How's my favorite delivery guy? Let me get my hands on those boxes. Whoa! That one is gigantic!

Chuck: You've got that right!

Jack: Thanks, Chuck! See ya tomorrow!

Kate: Let's open the big box.

Jack: Hey! It's a huge charcoal-colored monitor and a wireless keyboard and remote! Did they give us info on this stuff, Kate?

Kate: No, this is a real mystery. The only clue is this Gateway 2000® Destination™ logo on the front of the monitor.

Jack: According to this yardstick the monitor has a viewable area of 31 inches! Now my 21-inch monitor looks like a postcard.

Kate: Well, it could be something for presentations or a new tool for video conferencing. Or maybe it's a computing device that could replace the television.

Jack: You just might be onto something, Kate.

Kate: Gateway keeps rolling these new products off the line, don't they? It makes me wonder what else they have brewing up there in South Dakota. I have a feeling it's something spectacular.

Jack: You know I have the same feeling, Kate. What's that, Bob? Ted Waitt, Chairman and CEO of Gateway 2000, is on line three? Ted, you're on the air!

Ted: Hey, how are you guys doin'?

Kate: We're great. Say what's up with this Destination stuff?

Ted: There's some really cool stuff happening in the PC industry right now, Kate. The convergence of the PC, TV and consumer electronics is just around the corner, and all I can tell you is that these products play a big part in all of it.



Jack: What's your destination in all this, Ted? Are you saying there's a new PC in Gateway's future?



Ted: We're always coming up with new stuff, Jack. Let's just say there's a revolution on the horizon, and you can bet that Gateway will lead the way. Well, it's been great, but I gotta get back to work. Great show!

Kate: Wow! I can't believe Ted called us! Well that's enough hoopla for now. I bet the Gateway team put something awesome in our small box, too. Let's open it!

Kate: It's a performance-packed Gateway Solo™ S5-75XL multimedia portable PC. Hey, get a load of this invoice — it's only \$2,999!

Jack: Unbelievable! That's an incredible price for a full-featured multimedia portable PC. Value like that is hard to come by in today's PC market, especially on a hot product like this. It's no wonder the December 28, 1995, *Chicago Sun*

Times said, "The Gateway Solo is the best multimedia notebook on the market."

Kate: And, according to this press release, all Gateway Solo portable PCs now come standard with modular 4X CD-ROM drives and 10.4-inch SVGA color active-matrix screens.

Jack: Callers, what are your thoughts on the Gateway Solo portable PC? Matt from Montreal, go ahead!



The Gateway Solo S5-120XL portable PC features a 10.4" SVGA color display, 40MB RAM, 1.2GB hard drive, modular 4X CD-ROM drive, 28.8 PCMCIA fax/modem, 16-bit sound, speakers and MS Office 95 for only \$5,299.

Matt: I have to admit that's a tempting price tag, but there has to be a catch. I bet it has a dinky hard drive, almost no memory and low-rent software.

Kate: You've got it all wrong, pal. The Gateway Solo S5-75XL is outfitted with a roomy 540MB hard drive, 8MB RAM, 256K L2 pipelined burst cache, Microsoft® Works 95 and Windows® 95.

pentium
PROCESSOR

Multimedia Systems

P5-100 FAMILY PC™

- Intel® 100MHz Pentium® Processor
- 8MB EDO Performance DRAM
- 1.2GB 9ms EIDE Hard Drive
- 1MB DRAM, 64-Bit PCI Graphics Accelerator with MPEG Video Scaler
- 6X EIDE CD-ROM Drive
- 16-Bit Gateway Sound Card
- Altec™ Lansing ACS-40 Speakers
- TelePath® 28.8 Fax/Modem with TAD*
- Gateway Information Highway CD
- 3.5" Diskette Drive
- CrystalScan® 15.28dp Color Monitor (13.9" viewable)
- 7-Bay Desktop Case
- 104* Keyboard & MS Mouse 2.0
- Microsoft® Windows® 95
- Generations II Software Collection
- Gateway Gold™ Service & Support

\$1999

P5-120 FAMILY PC

- Intel 120MHz Pentium Processor
- 16MB EDO Performance DRAM
- 1.62GB 9ms EIDE Hard Drive
- 2MB DRAM, 64-Bit PCI Graphics Accelerator with MPEG Video Scaler
- 6X EIDE CD-ROM Drive
- 16-Bit Gateway Sound Card
- Altec Lansing ACS-40 Speakers
- TelePath 28.8 Fax/Modem with TAD*
- Gateway Information Highway CD
- 3.5" Diskette Drive
- Vivitron™ 15.26dp Color Monitor (13.9" viewable)
- 7-Bay Desktop Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- Generations II Software Collection
- Gateway Gold Service & Support

\$2499

P5-133 FAMILY PC

- Intel 133MHz Pentium Processor
- 16MB EDO Performance DRAM
- 1.62GB 9ms EIDE Hard Drive
- 2MB DRAM, 64-Bit PCI Graphics Accelerator with MPEG Video Scaler
- 6X EIDE CD-ROM Drive
- 16-Bit Gateway Sound Card
- Altec Lansing ACS-40 Speakers with ACS-250 Subwoofer
- TelePath 28.8 Fax/Modem with TAD*
- Gateway Information Highway CD
- 3.5" Diskette Drive
- CrystalScan 17.28dp Color Monitor (15.7" viewable)
- 7-Bay Desktop Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- Generations II Software Collection
- Gateway Gold Service & Support

\$2899

P5-166XL

- Intel 166MHz Pentium Processor
- 16MB EDO Performance DRAM
- 512K Pipelined Burst Cache
- 2GB EIDE 10ms Hard Drive
- Matrox® 2MB WRAM Graphics Accelerator w/ MPEG Video Scaler
- 6X EIDE CD-ROM Drive
- 16-Bit Ensoniq® Wavetable Sound Card
- Altec Lansing ACS-400 Speakers with ACS-250 Subwoofer
- TelePath 28.8 Fax/Modem with TAD*
- Gateway Information Highway CD
- 3.5" Diskette Drive
- Vivitron 17.26dp Color Monitor (15.9" viewable)
- 12-Bay Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition**
- Generations II Software Collection with Gaming Pad
- Gateway Gold Premium Service & Support

\$3799

* Telephone Answering Device (TAD) gives you complete voice messaging capabilities.

Professional Systems

P5-75

- Intel 75MHz Pentium Processor
- 16MB EDO Performance DRAM
- 850MB 10ms EIDE Hard Drive
- 1MB DRAM, 64-Bit PCI Graphics Accelerator
- 6X EIDE CD-ROM Drive
- 3.5" Diskette Drive
- CrystalScan 15.28dp Color Monitor (13.9" viewable)
- 7-Bay Desktop Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition**
- Gateway Gold Service & Support

\$1899

P5-120

- Intel 120MHz Pentium Processor
- 16MB EDO Performance DRAM
- 256K Pipelined Burst Cache
- 1.2GB 9ms EIDE Hard Drive
- 2MB DRAM, 64-Bit PCI Graphics Accelerator
- 6X EIDE CD-ROM Drive
- 3.5" Diskette Drive
- Vivitron 15.26dp Color Monitor (13.9" viewable)
- 7-Bay Desktop Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition**
- Gateway Gold Service & Support

\$2299

P5-133

- Intel 133MHz Pentium Processor
- 16MB EDO Performance DRAM
- 256K Pipelined Burst Cache
- 1.2GB 9ms EIDE Hard Drive
- 2MB DRAM, 64-Bit PCI Graphics Accelerator
- 6X EIDE CD-ROM Drive
- 3.5" Diskette Drive
- Vivitron 15.26dp Color Monitor (13.9" viewable)
- 7-Bay Mini Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition**
- Gateway Gold Service & Support

\$2399

P5-166

- Intel 166MHz Pentium Processor
- 16MB EDO Performance DRAM
- 256K Pipelined Burst Cache
- 2GB 10ms EIDE Hard Drive
- 2MB DRAM, 64-Bit PCI Graphics Accelerator
- 6X EIDE CD-ROM Drive
- 3.5" Diskette Drive
- Vivitron 15.26dp Color Monitor (13.9" viewable)
- 7-Bay Mini Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows 95
- MS Office 95, Professional Edition**
- Gateway Gold Service & Support

\$2899

Workstations

G6-150

- Intel 150MHz Pentium Pro Processor
- 16MB DRAM
- 256K Internal Cache
- 2GB 10ms EIDE hard drive
- Matrox 2MB WRAM Graphics Accelerator w/ Video Scaler
- 6X EIDE CD-ROM Drive
- 3.5" Diskette Drive
- Vivitron 15.26dp Color Monitor (13.9" viewable)
- 12-Bay Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows NT™ Workstation 3.51 or MS Windows 95
- MS Office 95, Professional Edition**
- Gateway Gold Service & Support

\$3199

G6-200

- Intel 200MHz Pentium Pro Processor
- 64MB DRAM
- 256K Internal Cache
- 2GB Fast SCSI-2 9ms Hard Drive
- Adaptec® 2940 32-bit PCI Ultra SCSI Fast-20 Controller
- Matrox 4MB WRAM Graphics Accelerator w/ Video Scaler
- 4X SCSI-2 CD-ROM Drive
- 3.5" Diskette Drive
- Vivitron 21 Color Monitor (19.9" viewable)
- 12-Bay Tower Case
- 104* Keyboard & MS Mouse 2.0
- MS Windows NT Workstation 3.51 or MS Windows 95
- MS Office 95, Professional Edition**
- Gateway Gold Service & Support

\$6799

** MS Office 95, Professional Edition includes Word, Excel, PowerPoint® presentation graphics program, Schedule+, Access database and Bookshelf® '95.

Gateway 2000 Manufacturing, North Sioux City, South Dakota, is ISO 9002 certified.



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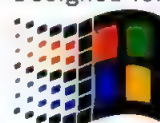


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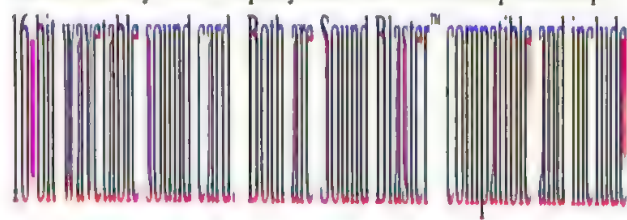
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Hi-Fi Extras!

Multimedia (Sold only with the purchase of a system)

Audio Multimedia Kits

Choose a Gateway 16-bit CD-quality sound card or an Ensoniq® Soundscape™



two Altec™ Lansing ACS-40 speakers.

\$95 (Gateway 16-bit sound card and Altec ACS-40 speakers)

\$155 (Ensoniq Soundscape 16-bit wavetable and Altec ACS-40 speakers)

Multimedia Speaker Upgrades

Add the all-new Altec ACS-250 subwoofer for up to 40 watts of additional heart-pounding bass and extraordinary Dolby® Surround Sound.

\$75 (upgrade from systems which include Altec ACS-40 speakers)

The Dolby® Surround Sound Gateway-exclusive ACS-400 speaker system will make your multimedia applications come alive with true theater-like surround sound. Complete with two Altec ACS-400 satellites and ACS-250 subwoofer.

\$120 (upgrade from systems which include Altec ACS-40 speakers)

4X Three-CD Changer

Gain access to three times the amount of information of a single CD-ROM with a 4X three-CD changer. Ask your sales rep about this exciting upgrade offer!

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Internal fax/modem, 28,800bps modem, V.34, with 28,800bps fax capability. Sends and receives data and faxes, and includes Telephone Answering Device (TAD) for full voice mail capabilities. Includes trial memberships to CompuServe®, AOL and Prodigy® and more! **\$149** (TelePath 14.4 Fax/Modem \$79)

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Any key on this handy 124-key custom keyboard can be programmed to perform any function or series of keystrokes. Plus it features convenient Windows keys for ease of use with Microsoft Windows 95. **\$20** (upgrade from 104® keyboard)

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Gateway Vivitron™ Color Monitors

Non-interlaced color monitor using Sony® Trinitron® tube technology, capable of 1280 x 1024 resolution. (Upgrade prices good only at time of system purchase.)

Gateway Vivitron15 Color Monitor, .26 dot pitch (13.9" viewable)

Upgrade from a CrystalScan®14 (13.4" viewable) to Vivitron15 **\$150**

Upgrade from a CrystalScan15 (13.9" viewable) to Vivitron15 **\$65**

Gateway Vivitron17 Color Monitor, .26 dot pitch (15.9" viewable)

Upgrade from a CrystalScan15 (13.9" viewable) to Vivitron17 **\$355**

Upgrade from a Vivitron15 (13.9" viewable) to Vivitron17 **\$290**

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■ Extended Three-Year On-Site Agreement*

■ Priority 800 Number For Access To Technical Experts

\$99 w/ system purchase **\$129** within current on-site service agreement

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Only available to our valued customers! Windows 95 will make your system faster and easier to use. Order your copy today! **\$79** (On diskettes \$89)

10th Anniversary Software Bundle

Includes BioForge™; Wing Commander® III: Heart of the Tiger™; Magic Carpet™ II: The Netherworlds; and a Gateway 2000 10th Anniversary T-shirt. **\$49**

(BioForge may not be suitable for younger children.)

Kid's BackPack™ II

Includes What is a Bellybutton?; The Tales of Peter Rabbit; Cinderella, The Original Fairy Tale; Freddy Fish™ and the Case of the Missing Kelp Seeds™; Pocahontas Reading Adventure, and a Gateway cow-spotted backpack. **\$59**

Finance Pack

Includes Quicken Deluxe 5, Quicken® Financial Planner™, Quicken Family Lawyer™, and Quicken Parents' Guide To Money™. **\$69**

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Includes Command & Conquer™, Virtual Pool™; Straight/8, The Journeyman Project 2®:Buried in Time™, Terminal Velocity™, Primal Rage™, and a Gravis™ GamePad™. **\$79**

Printers (Available to both existing and new Gateway customers)

Epson® Stylus™ Color IIs Ink Jet Printer

Photo-quality printing in color and black-and-white. Drivers are compatible with virtually all MS applications. **\$259** (plus \$30 rebate for a limited time only)

Epson Stylus Color II Ink Jet Printer

Perfect for the small business or home office, providing vivid color and crisp black-and-white printing at 720dpi. Plus it's quiet and compact! **\$399**

Hewlett® Packard DeskJet 600C Inkjet Printer

The HP 600C ColorSmart technology produces clear, vibrant color with 16.7 million colors to choose from! Black 600dpi printing on plain paper or up to 600 x 300dpi color printing. Includes 34 scalable typefaces. **\$259**

Hewlett Packard LaserJet 5L Printer

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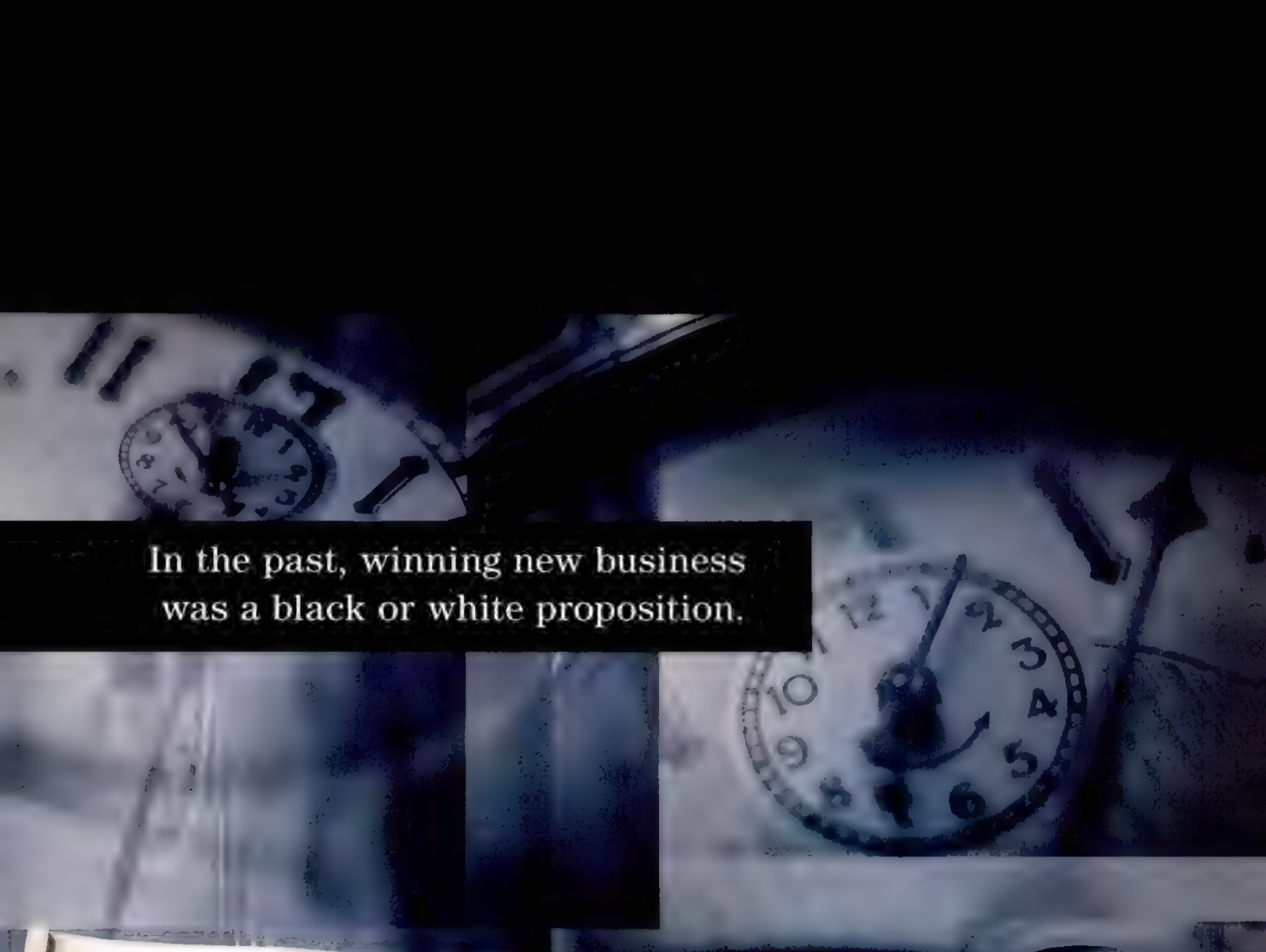


Lexmark Medley 4sx Color Printer

Enjoy true multitasking with the 4-in-1 Lexmark Medley 4sx. Now you can fax, print jazzy colors, make crisp copies and direct scan with one printer. Prints over 16 million colors at 300 x 300dpi or black 600 x 300dpi on plain paper. **\$749**

Hewlett Packard LaserJet 5P Printer

Full-featured HP LaserJet printer for your business printing needs. Provides up to 600dpi resolution at six pages per minute. **\$849**



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was a black or white proposition.

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First impressions are important, but business is often won or lost based on last impressions. So why shouldn't your proposals be as impactful and persuasive as possible? With the new HP Color LaserJet 5 printer, they can. Dramatic improvements in technology allow the Color LaserJet 5 to create 1200 dpi equivalent image quality, literally producing millions of permanent solid colors. The Color LaserJet 5 is compatible with all popular software and is fully networkable. Best of all, with its remarkably low cost of



SCANNERS

Primax's PaperEase Trades Performance and Scan Quality for a Low Price

By Alfred Poor

The personal-scanner market keeps getting more and more crowded; everyone wants an inexpensive compact, gray-scale scanner that doesn't require too much desktop room and is easy to use for grabbing text or images from individual pages. Primax's \$249 PaperEase raises the standard for features while lowering the cost threshold. Although it doesn't perform as well as some of the more expensive products, it may be sufficient for many users.

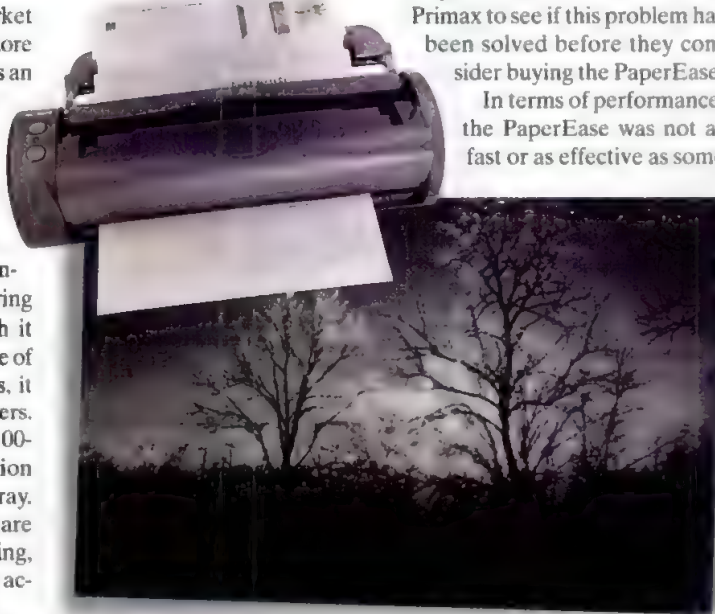
The scanner is capable of 100- to 600-dot-per-inch resolution scans in up to 256 levels of gray. And while many competitors are limited to single-sheet feeding, the PaperEase input tray can accommodate up to ten sheets.

The PaperEase includes Document Manager software, a Windows package that will automatically start the scanner when it senses that a page has been inserted and a Twain driver for use with other Twain-compatible programs. The scanner also includes Xerox's optical character recognition software (OCR), TextBridge.

SCAN CENTRAL

Based on a desktop metaphor—much like Visioneer's PaperPort software—the PaperEase's Document Manager is where everything you scan goes first; Twain scans go directly to the chosen application. Once scans are on the desktop, you can combine or separate images, annotate and highlight them, and drag and drop them on icons for your printer or Windows applications (such as your faxing, image-editing, or word processing programs of choice). You can also specify whether you want the image converted to text via TextBridge when it's being transferred.

The PaperEase is fairly easy to install. It uses a parallel-port con-



DIGITAL DOCUMENTS: The paper tray on Primax's PaperEase can hold up to ten pages. Scans of some originals resulted in pronounced stripes.

nection, and an external power supply plugs into the parallel connector; a printer pass-through is included. The scanner itself features buttons so that you can configure the unit on the fly for either text or photos. You can also send the image to the desktop software, a printer, or a fax modem.

The main hitch that we encountered was a bug in the installation software that configured the software for the wrong directory. A Primax representative stated that this problem would be corrected before this review appears in print. We also tried to test the unit on a Gateway Pentium system, but it wouldn't work and we had to use a different PC. According to Primax, the problem is caused by the design of the parallel port in the Gateway system; Gate-

way owners should check with Primax to see if this problem has been solved before they consider buying the PaperEase.

In terms of performance, the PaperEase was not as fast or as effective as some

of its more expensive competitors. It took 28 seconds to scan a full page of text but another 94 seconds to perform the OCR, open Microsoft Word for Windows, and load the file. The conversion was fairly accurate for the content on 12-point type, but it



COPY ON DEMAND: The PaperEase Document Manager includes a convenient Copier function that lets you print copies of a scanned image on your printer.

was fairly poor on 8-point type. TextBridge managed to retain some of the bold, italic, and underline attributes, but it did not

retain changes in typeface. And it did not handle snaking columns or boxed text well.

For gray-scale images, it took 91 seconds to scan a 5- by 7-inch photo. Since the scanner uses a green light as opposed to a white one, there's a visible impact on gray-scale scans of color images. There were pronounced vertical streaks in the image, resulting in a pin-striped effect. This is probably not a problem for casual or internal business use, but the resulting scan is clearly not good enough for publication.

The paper feed was also unable to feed through a 4- by 6-inch photograph reliably when it was fed long-edge first. We had to turn the photo short-edge first and then rotate the image in the software. The machine did feed business cards successfully, but some required multiple attempts to get a straight feed. When feeding multiple pages of text, the scanner would frequently grab two pages at once, creating a single, long image.

BARE-BONES SOFTWARE

The Twain driver also had its limitations. There is no preview feature and no prescan facility that would let you crop or otherwise adjust the image before scanning.

And even those handy buttons on the scanner itself are not as automatic as they might appear. All the Copy and Fax buttons do is cause the corresponding software to load automatically, which only saves you the effort of clicking on the appropriate icon on the screen's desktop.

The PaperEase is a good choice for those on a budget. It can't keep up with Hewlett-Packard's HP ScanJet 4s or Visioneer's PaperPort VX in terms of scan quality or speed. On the other hand, Primax's competitors will have to scramble to match its price.

PaperEase. List price: \$249. Requires: 4MB RAM, 10MB hard disk space, Microsoft Windows 3.1 or later or Windows 95, parallel port. Primax Electronics, Sunnyvale, CA; 800-338-3693, 408-522-1200; <http://www.primaxelec.com>. Circle 415 on reader service card.

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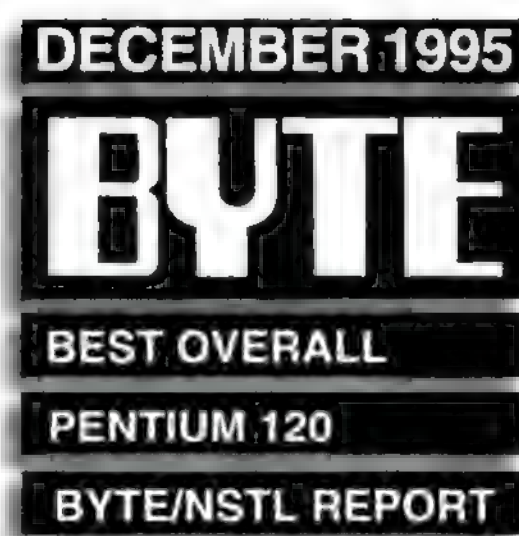
February 20, 1996
SAG STF 166 Pentium



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Internet Server SFT Alpha



120MHz Pentium STF 120

"SAG is the clear leader in our price/performance scale. Both systems were top notch performers turning in the best Winstone 96, Graphics Winmark 96 and Disk Winmark. Both are loaded with powerful components."

PC Magazine

"This system takes top honors based on its performance, expandability, and low price tag."

BYTE

"SAG is the clear choice for power users. In fact, SAG 120Mhz Pentium finished with higher overall performance ratings than other 133Mhz systems."

BYTE



Top Honors
Pentium 120 System
October 1995

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- TOWER CASE 300 WATT

Fastest Hard Drive Made

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IMAGINE 128, FASTEST, GRAPHICS, DRIVE, AND MOTHERBOARD

90 • 100 • 120 • 150 • 166 • 200 PENTIUM SUPPORT AVAILABLE

1 INTEL 166MHZ CPU
512K PIPELINE SRAM
TRITON SX CHIPSET

16 MB EDO RAM TO 128 MB

SLOTS: (4) PCI, (4) ISA
6x CD ROM / MOUSE

IMAGINE 128 SERIES II 128 BIT "3D" 4M VRAM

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KEYBOARD, FLOPPY, MS MOUSE

TOWER CASE 300 WATT

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256 BIT BUS

2MB CACHE EXPANDABLE TO 8MB

1 DEC 300MHZ ALPHA CPU USING 2164 CHIP TECHNOLOGY

64MB RAM EXPANDABLE TO 1GB

4x CD-ROM ELSA 4MB "3D" VIDEO CARD

4GB 7200 RPM SCSI WIDE DRIVE

SLOTS: (3) PCI, (2) PCI ISA

(1) SHARED
TOWER 300 WATT

RAID 5 SERVER - DUAL 150 MHZ SMP

1 INTEL PENTIUM 150 MHZ CPU

512 K CACHE

16 MB RAM EXPANDABLE TO 512

3 TWO GB 8 MS HARD DRIVES

RAID 5 CONTROLLER

SLOTS: (3) PCI; (5) EISA

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TWO 300 WATT REDUNDANT POWER SUPPLIES

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KEYBOARD AND 1.44 FLOPPY

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UNINSTALLERS

Remove-It and UnInstaller: Brave vs. Cautious File Removal

By Edward Mendelson

MicroHelp's \$39.95 UnInstaller 3 for Windows 95 and Vertisoft's \$39.95 Remove-It for Windows 95 take very different routes to removing the flotsam and jetsam that accumulate on your system's hard disk. These two packages join Quarterdeck Corp.'s CleanSweep 95 (First Looks, January 9, 1996) in the small field of programs designed to remove unused applications and miscellaneous files from Windows 95 installations.

Of the three, UnInstaller is the slowest, has the least friendly interface, and is the most limited. But UnInstaller makes it hard to do damage by inadvertently removing a key file. Remove-It, like CleanSweep, is fast, ambitious, and full-featured, but both can tempt users to remove files—an action they may regret afterward.

There is much in common among these three uninstallers. All three can remove applications already on your disk before the utility was installed but do much better when you use the included installation-monitoring utility. Each program can store applications in compressed archives and move applications from one drive or directory to another. And although all three programs can transfer applications to another machine without the original installation, CleanSweep and UnInstaller require that both machines have a copy of the uninstaller loaded.

Which you choose depends on how close to the edge you like to live, how much extra time you

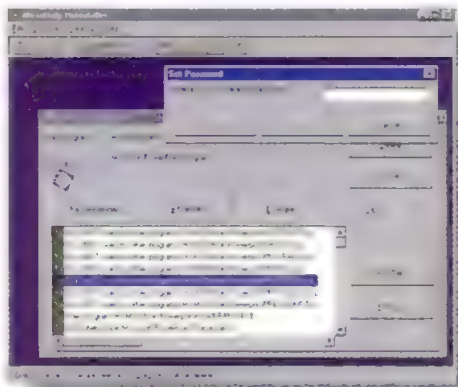
have, and how much disk space you want reclaimed.

UNINSTALLER 3 FOR WINDOWS 95

UnInstaller 3 for Windows 95 continues to open on a mostly blank screen, and you choose its functions from the top-line menu or a toolbar. When you run it for the first time, you'll have to wait many minutes while it compiles an elaborate database of programs and related files on your disk. The program supplements this with a database listing files installed by popular applications.

UnInstaller is limited to removing one application at a time, while its rivals can excise an entire program group at once. During testing, it often missed .INI and other files that could have been safely removed.

The program no longer offers to find orphaned dynamic link library (.DLL) and Visual Basic Extension (.VBX) files that are no longer used by applications. UnInstaller still lists orphaned executable files that aren't listed on your Start menu but only offers to put the files back on your

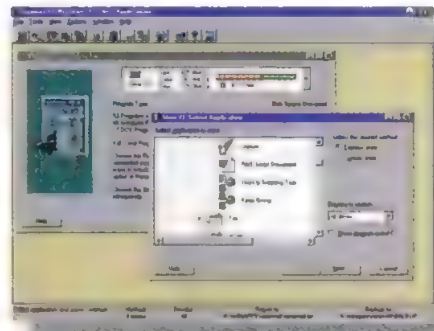


PROTECTED: UnInstaller 3 lets you password-protect access to the program.

menu or desktop; you'll have to find and delete them manually.

UnInstaller includes cleanup functions that can remove help files, multimedia files, and other space-wasters that can be deleted

without causing damage. Its duplicate-file finder lets you restrict its search to exact byte-by-byte matches. This level of caution is based on the principle that disused files left on your PC do no harm—they just occupy disk space.



COACH: Remove-It's Cleanup Coach walks you through removing or archiving applications.

One questionable UnInstaller feature lets you turn off the ability to make a compressed backup of any application you remove. If you turn this feature off, it stays off until you reset it. CleanSweep and Remove-It both make backups unless you turn off the feature for each program you remove.

If you're an expert user who installs and removes multiple applications and are adept at identifying which .DLLs to remove, UnInstaller will strike you as too slow and too cautious. But for everyone else, UnInstaller is the only application remover safe enough to leave on your system. **UnInstaller 3 for Windows 95.** Estimated street price: \$39.95. Requires: 4MB RAM, 6MB hard disk space, Microsoft Windows 3.1 or later or Windows 95. MicroHelp Inc., Marietta, GA; 800-777-3322, 770-516-0899; <http://www.microhelp.com>. **Circle 479 on reader service card.**

REMOVE-IT FOR WINDOWS 95

Remove-It for Windows 95 scans your disk quickly when it starts up and won't make you wait the way UnInstaller will. When removing an application from your disk, it's impressively thorough, and we found that it restores more disk space than any other uninstaller.

Remove-It scans your disk for links between applications and other files when you first install it

and quickly rescans your disk every time you launch it. It also uses a database of files installed by common applications.

The interface consists of a clear menu of options that includes a wizard-style series of dialog boxes

that walks you through the process of removing unneeded files. The program retains its traffic-light sequence of red, yellow, and green icons to indicate what is safe or questionable to delete. Remove-It's cleanup menu offers to remove orphaned .DLL and executable files. The program lists each of these files with a yellow traffic-light icon

next to the filename to indicate caution.

Many of these files are required by important Windows features, and only users who are thoroughly conversant in the intricacies of Windows 95 should consider removing them. The program also tells you it's safe to remove various OLE associations in the Windows Registry, but on our test system many of these were in fact required.

This upgrade, Version 3.0, was over-aggressive in its list of miscellaneous files that it judged safe to remove; it also gave us the green-light icon to remove the backup software in the Adaptec EZ-SCSI package. Vertisoft's Version 3.01 fixes this problem.

Unlike CleanSweep, neither Remove-It nor UnInstaller tell you exactly what they will do to the Windows Registry when they remove an application.

On the whole, UnInstaller is the safest application remover and Remove-It is the most thorough, but be careful when using the latter that you don't delete files that you may need later.

Remove-It for Windows 95. Estimated street price: \$39.95. Requires: 4MB RAM, 3MB hard disk space, Microsoft Windows 95. Vertisoft Systems Inc., San Francisco, CA; 800-466-5875, 847-295-3163; <http://www.vertisoftsys.com>. **Circle 478 on reader service card.**

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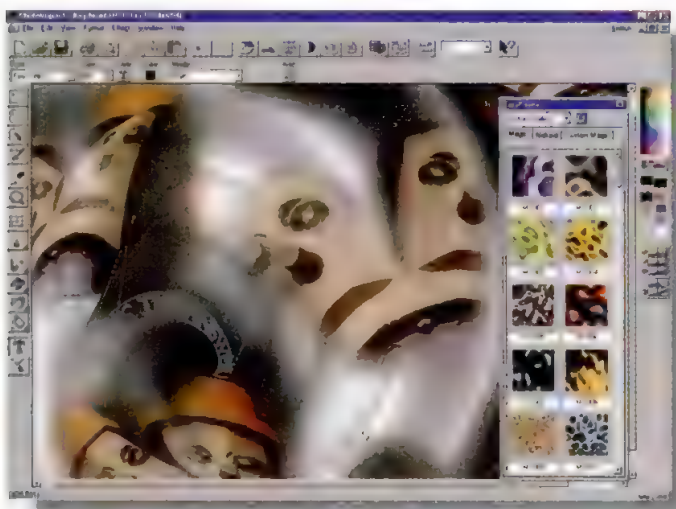
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First Looks



DESKTOP DESIGNER: *Easy Palette lets you drag and drop textures and other eye-catching effects onto images.*

is a great way to generate abstract art from images quickly.

As with competitors such as Adobe Photoshop, Corel Photo-Paint, and Micrografx Picture Publisher, PhotoImpact now supports the ability to layer bit-mapped objects. But the merge options were limited to darker or lighter, hue, and hue and saturation. You can select a color that you want to render transparent, along with a tolerance range of RGB values (to make a range of values within a gradient transparent, for example).

Version 3.0 also adds paint-on masking to its image-editing tool chest. This works fairly well, but after repeated use, we became annoyed with the program's need to jump out of image-mask mode whenever we zoomed in or out of the image.

PhotoImpact can treat text as a selection, an object, or a path. The text remains editable until you apply image attributes, such as a gradient fill.

You can also trace objects to edit selection paths using Bezier curves; during the tracing process

PhotoImpact are impressive. Though the program provides previews similar to Photoshop's Variations and manual controls, we found its automatic decision making unreliable or ineffective for operations such as color and tone balancing. Worse, there's no way to calibrate the product effectively for either a scanner or a printer.

With PhotoImpact, Ulead is targeting the display-only crowd, World Wide Web designers, presenters, and multimedia developers. As a result, the program speaks nothing but RGB and some halting CMYK. But most users will want to mix colors using HSB values or import the occasional CMYK TIFF image, neither of which the program fully supports.

With Version 3.0, Ulead has beefed up the database capabilities of PhotoImpact Album. It now offers some predefined database types with relevant fields for specific tasks. For instance, we created a photographer's database complete with fields for aperture and shutter speed. The program can now monitor a specific folder for file types, though you still can't search across albums.

The last newbie feature is PhotoImpact Explorer, which uses Windows 95's Explorer metaphor to display image thumbnails. Both Album and PhotoImpact Explorer offer a compact mode so that they can reside neatly on one side of your screen.

PhotoImpact 3.0's image-editing tools are not as broad or deep as those in Quarterdeck Corp.'s HiJaak 95. And if you're concerned with print quality or high-quality retouching, you're better off with Photoshop or Picture Publisher. But for most other needs, PhotoImpact 3.0 delivers an impressive set of imaging tools in a streamlined package.

Ulead PhotoImpact 3.0. List price: \$199. Requires: 8MB RAM, 30MB hard disk space, Microsoft Windows 95 or Windows NT 3.51. Ulead Systems Inc., Torrance, CA; 800-858-5323, 310-523-9393; <http://www.ulead.com>. Circle 440 on reader service card.

IMAGE EDITING

PhotoImpact Gets a New Image And More Powerful Tools

By Lori Grunin

What's in a name? A lot for Ulead Systems. The company has transformed its friendly but limited suite of image manipulation utilities, ImagePals, into the more versatile and powerful Ulead PhotoImpact 3.0. The \$199 package for Windows 95 and Windows NT, which consists of an image editor, a file management and cataloging utility, a screen-capture tool, an Explorer-like viewer for image thumbnails, and a PhotoCD browser, improves on its predecessor and even sports some truly interesting tools.

The core of the image-editing suite is PhotoImpact, the image editor. The most visible and generally useful addition is Easy Palette, which gives you thumbnail-based, drag-and-drop access to gradient fills, layer management, natural and fractal textures, objects, special effects, and styles. The ability to drag gradient fills and textures and drop them into the background encourages experimentation.

Easy Palette might appear to be a cosmetic change, but it controls some tools with real depth. For instance, Style Gallery lets you modify the chrominance, in-

tensity, and saturation of a picture by copying settings from a reference image: We applied the saturation of a scan of a crumpled paper bag to an image to give it a nice, desaturated—but not too gray—appearance.

The revamped gradient tool lets you choose from a large, practical selection of predefined algorithmic patterns and palettes. You can also change colors and parameters such as amplitude, frequency, repeats, and slope. Even novice users will be able to generate some wild results in PhotoImpact by modifying the presets. It took us just 5 minutes to generate a credible vortex—a task that could take twice as long in more complex programs such as MetaTools' Gradient Designer in Kai's Power Tools.

Hidden in PhotoImpact's otherwise standard grab bag of special effects, you'll find the spectacular Kaleidoscope, which generates a variety of funky, tiled patterns from any portion of an image. This

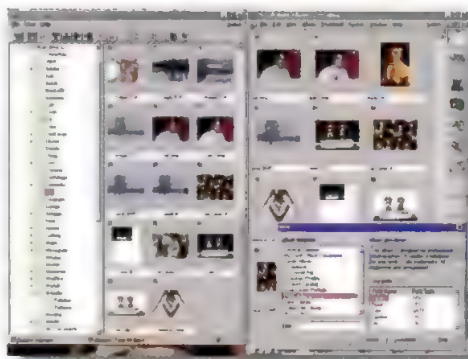


IMAGE ORGANIZER: *PhotoImpact 3.0 includes an Explorer window that displays file types.*

you can adjust the *tolerance* (the distance between points) and the *jump point* (a measure of curve accuracy). But it's hard to see the nodes in the thumbnail view in which you adjust tolerances, and we didn't find the path editing very fluid.

The basic retouching tools in



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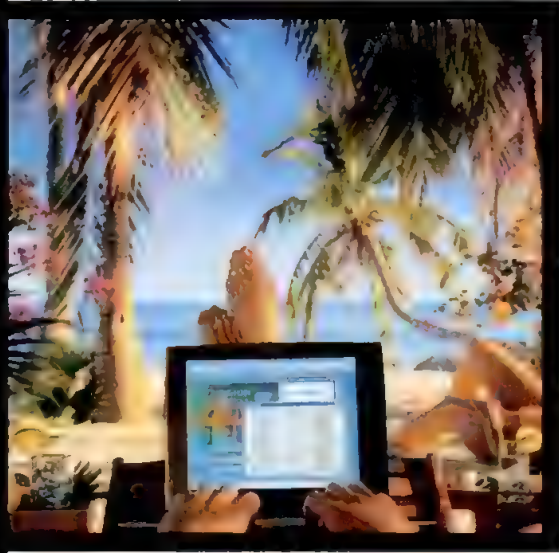
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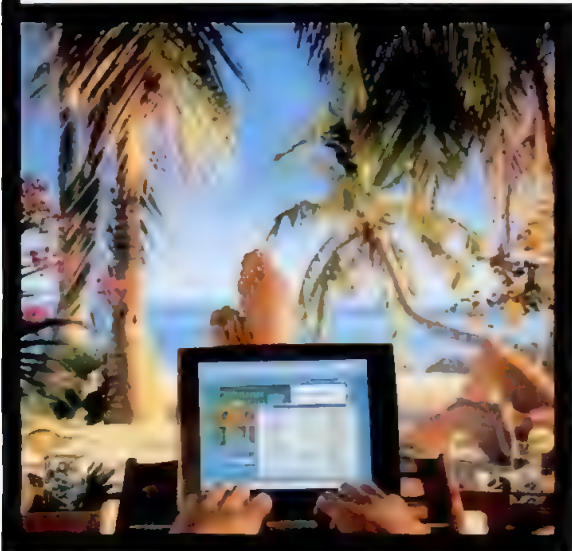


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BACKUP

WinSync Backs Up Your Data With Point-and-Click Ease

By Charles Lin

Tired of manually backing up your files to the network file server? Whitehill Technologies can make your life easier with its \$59 directory-mirroring and file-archival utility, WinSync. In spite of a few minor quirks, WinSync is an invaluable tool for preserving the integrity of your data.

WinSync uses a "working" directory and a "backup" directory scheme. When copied into the Windows Startup Program Group and running in continuous mode, WinSync monitors your files as you work. The program checks the working directory for files that have been modified since the last synchronization has been done.

WinSync relies on the time stamp of each file to monitor which files have changed. The program then copies the relevant files into the appropriate backup directory.

The user can define the frequency of the backups and expiry times. The use of file-expiry times lets you get rid of old and unwanted files in your directory. By using the combination of expiry time and WinSync's archival function, you can automatically archive your disused files and remove them from your working directory.

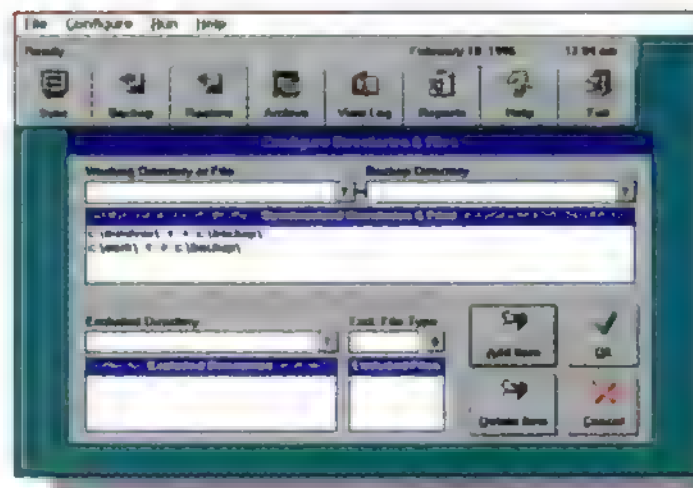
If you deleted a file from your working directory, WinSync will label the mirrored file in the backup directory as an "orphan" file. You will then have the option of copying the file back to your working directory, deleting it from the backup directory, or ignoring it.

When two working directories are used for the same backup directory, however, WinSync only recognizes the first working directory and labels all the files from the remaining working directories as orphans, regardless

of their status. The only solution we could get to work was to create a separate backup directory for every working directory we used, which can be a cumbersome fix.

The key missing element is that WinSync doesn't incorporate file compression. When it archives a file, the actual files can get large fast.

During our evaluation, we also encountered other more



CLICK AND KEEP: WinSync lets you choose what to back up with an intuitive interface.

minor problems with WinSync. For example, the program was stable on our networked Windows for Workgroups 3.11 test machine. But only after we installed several updated files did

WinSync work well with our Windows 95 test system.

WinSync does have a few quirks, but the program makes backing up files to the network a point-and-click snap.

WinSync. List price: \$59. Requires: 8MB RAM, 1MB hard disk space, Microsoft Windows 3.1 or later

or Windows 95. Whitehill Technologies Inc., Moncton, New Brunswick, Canada; 506-855-0005; fax, 506-855-8473; 5362.446@compuser.com. Circle 413 on reader service card.

BACKUP

Arc Solo for Windows 95: Backup for the Masses

By Sal Ricciardi

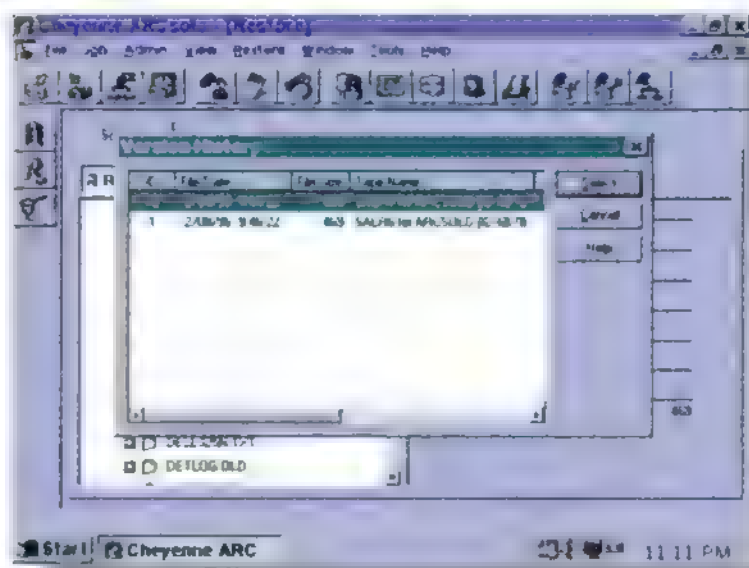
If you're shopping for a Windows 95 backup solution, put Cheyenne's \$149 Arc Solo for Windows 95, Version 1.0, at the top of your list. The product brings an impressive array of backup features to standalone PC users, although our testing indicates that if you use its powerful database features, its performance may be disappointing.

Arc Solo feels right at home in the Windows 95 environment. It uses tabbed dialog boxes and an Explorer-like hierarchy to present your source and destination choices. For example, you can choose My Computer to back up your entire system at once or select individual drives, directories, and files on your PC or a shared network resource.

Backup jobs can be customized in a variety of ways and scheduled for execution at a particular time (such as midnight) or at regular intervals (such as every Saturday). You can even back up

a volume directly from Explorer. Just right-click on the drive and choose Backup to start a backup job running in the background.

Where Arc Solo really shines is in its extensive reporting and management options. The program maintains a database of information on all of your backup sessions and then lets you view this information in a variety of useful ways. For example, you



WHERE'S THAT FILE? Arc Solo for Windows 95 maintains a database of backup information, making it easy to track your tape library.

can quickly get answers to questions such as "What versions of this file exist on tape?" or "Which tape did I use last?"

You'll have to pay a little in terms of performance for this convenience, but we found the cost more than worthwhile. If speed is

of the essence, you can easily disable Arc Solo's database if you want to trade this level of detailed information for faster operations.

Arc Solo's disk-based recovery utility lets you restore your system from tape without having to reinstall the operating system. We tested this feature and after suffering some setbacks because of missing documentation, we found it worked as intended—albeit slowly.

During testing, the most noticeable absence was support for anything other than a SCSI device. By the time you read this, Cheyenne will have added support for QIC/Travan devices, parallel-port devices, and removable media such as floppy disks, magneto-optical disks, or ZIP disks to its existing support for SCSI devices.

If you're interested in protecting your data, look no further than Arc Solo.

Arc Solo for Windows 95, Version 1.0. List price: \$149; upgrade, \$19.95. Requires: 8MB RAM, 12MB hard disk space, Microsoft Windows 95, supported SCSI tape drive and adapter. Cheyenne Software Inc., Roslyn Heights, NY; 800-243-9462, 516-484-5110; <http://www.cheyenne.com>. Circle 414 on reader service card.

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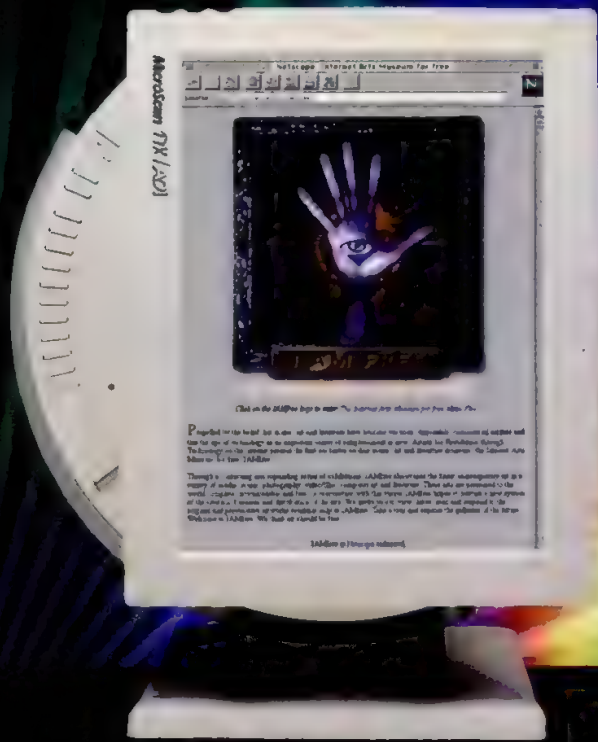
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CIRCLE 226 ON READER SERVICE CARD

VIDEO

Sony's RTE-3000A Handles MPEG-1 Compression—Regardless of Source

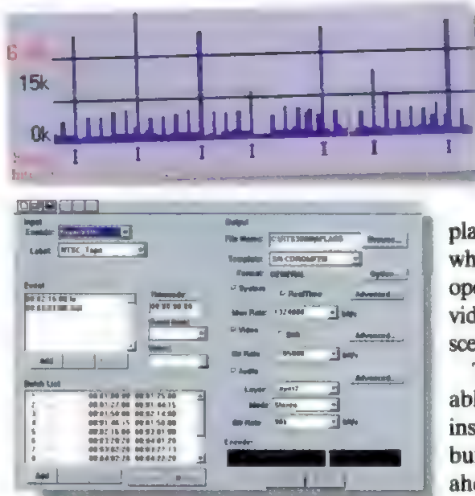
By Jan Ozer

In the high-end MPEG-1 video-compression market, there are two choices: option-rich supercomputers that produce top-quality video in non-real time and less flexible PC-based encoders that produce lesser quality real-time video. Sony's RTE-3000A Advanced Real-Time MPEG-1 Encoder combines the best of both, automating most quality-critical compression adjustments to produce pristine compressed-video quality in real time. At \$70,000, it's not cheap, but the RTE-3000A delivers a lot for those who routinely convert large amounts of raw video to MPEG-1 for the PC.

The RTE-3000A integrates Sony's RTE-3000B Real Time Encoder and a rack-mounted standalone MPEG-1 encoder. The system we tested also included the RTP-3000 Digital Input/Output Board, which enables digital audio and video input, and the RTP-3100 Image Processor Board, which provides advanced filtering and inverse telecining. The beauty of the RTE-3000A system is that it is controlled by a Windows-based PC via an ISA card.

The unit's compression engine is a custom MPEG-1 chip set that accepts downloadable instructions for easy updating. Other features include audio and video decoding during encoding for real-time quality monitoring and frame-accurate VTR control of any video deck that is RS-422-compatible.

Sony's control software, MPEG-1 Factory, provides manual and batch encoding with included templates for common output, such as VideoCD, as well as single- and double-speed CD-ROM rates. The software supports encoding pause and restart, allowing the user to customize



IN CONTROL: The RTE-3000A's Windows interface has a multitude of adjustments and allows you to view frame statistics graphically.

compression parameters by scene and then concatenate the individual files into one long clip.

The interface is logical and generally well thought out, although we found that entering batch lists of input and output points was cumbersome. We tested the RTE-3000A on a Gateway 2000 Pentium/133 PC with 16MB of RAM running Windows 95. Our source deck was a Sony Digital BetaCAM A500, inputting component digital video to the RTE-3000A's serial digital interface and digital audio through the AEX/EBU port.

MPEG-1 quality relates both to the quality of the digitized video and to the ability to customize compression parameters. The RTE-3000A excels in both areas. For example, before compression, the RTE-3000A anti-aliases the digitized video to improve edge quality and removes analog noise with a low-pass filter.

MPEG-1 files are composed of Groups of Pictures, or GOPs, which in turn are composed of I, P, and B frames. I frames appear at the beginning of every GOP and

serve as a reference for subsequent P and B frames. Scene changes require a new I frame, and most high-end encoders rely on the manual placement of I frames, which forces the developer to scan through the video first to identify scene changes.

The RTE-3000A enables manual I-frame insertion but also can buffer up to 30 frames ahead and behind to identify scene changes automatically. Then, through a process called

Adaptive Bit Rate Encoding (ABRE), the RTE-3000A dynamically modifies the GOP structure to maximize quality and bandwidth.

We tested ABRE by compressing a file with scene changes at irregular intervals. The system reacted well to different scene lengths and produced much clearer frame images, without the blocky artifacts that were apparent without ABRE.

To test all-around video quality, we compressed 12 diverse video clips with the RTE-3000A operating in automatic mode and compared the output with the products of several supercomputer-based service bureaus. In general, the Sony unit produced sharp, clear video with excellent color fidelity and minimal background noise.



SHARP: Using Sony's ABRE technology, the RTE-3000A Advanced Real-Time MPEG-1 Encoder produces crisp frame images.

The only video clips where the RTE-3000A consistently lagged were dynamic scenes such as wavy ocean footage or extremely high-motion sequences, whereas the supercomputers' compressed files exhibited slightly less blockiness.

The RTE-3000A also provides advanced processing for moving film to video. Motion pictures are filmed at 24 frames per second (fps), while interleaved NTSC video contains 60 fields per second, 2 for each frame. When converting film to video, a process called *telecining* creates the additional fields. MPEG-1 is frame-not field-based, so when compressing film to video, the encoder must first inverse telecine to isolate the correct fields, or else the MPEG output will appear jerky. This gets complicated when the source tapes contain footage of mixed origin.

We encoded a videotape of a movie and a rock video containing both video and filmed sequences, compressing to both 24 and 30 fps. The MPEG-1 video produced by the RTE-3000A was clean and smooth at both frame rates.

Though clearly not meant for the average desktop, Sony's RTE-3000A should prove a cost-effective way for high-volume MPEG producers to create top-quality compressed video.

RTE-3000A Advanced Real-Time MPEG-1 Encoder. List price: \$70,000. Requires: 8MB RAM, 3MB hard disk space, Microsoft Windows 3.1 or later or Windows 95. Sony Electronics Inc., Business and Professional Products Group, Montvale, NJ; 800-686-7669; <http://www.sel.sony.com/SEL/bppg>. Circle 412 on reader service card.

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INTEGRATED SOFTWARE

PerfectWorks 3 Adds Tight Integration and Links to the Online World

By David Haskin

Rather than follow the market leader, Microsoft Works, Novell's \$79 PerfectWorks 3 blazes its own trail with a feature set and a level of connectivity and integration that Works can't match.

PerfectWorks' core word processing, spreadsheet, and database modules match and sometimes surpass those of Works (First Looks, October 10, 1995) and ClarisWorks (First Looks, March 26, 1996). Unlike Works, PerfectWorks includes a grammar checker and QuickCorrect, which fixes spelling errors on the fly.

The word processing module in PerfectWorks supports basic capabilities such as bullets, columns, footers, and headers. You can even create chapters with individual page numbering, footers, and headers.

STYLE-CONSCIOUS

Like Works and ClarisWorks, PerfectWorks' word processor and spreadsheet support styles for quickly establishing a document's format. The spreadsheet has 100 built-in functions, significantly more than those found in Works. PerfectWorks has an auto-sum icon for adding rows or columns, although automatically completing a data series requires a trip to the menus. PerfectWorks provides 84 chart types and extensive formatting options, including the ability to alter the depth and angles of 3-D charts.

The flat-file database is the program's least powerful module but is quite simple to use. It supports seven types of fields, and the well-designed and self-evident dialog boxes make things such as field verification easy.

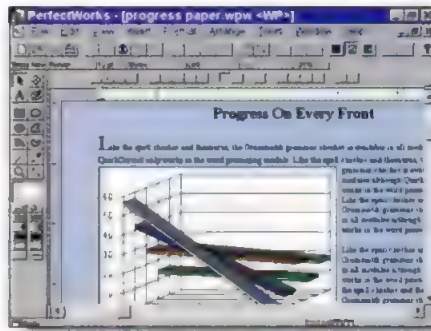
The missing link is that PerfectWorks has no report generator. The closest you can come is adding a summary field to a database, such as an average, count, or

sum, before printing out records.

Beyond its core modules, PerfectWorks includes drawing and paint applications that are notable because they include special effects such as mosaic, drip, and color stereogram effects. There's also a version of Quicken, which provides basic checkbook management capabilities but no investment or budgeting tools.

Although its modules are strong, PerfectWorks' integration and connectivity capabilities are what really sets it apart. It has direct links to the Windows 95 dialer so that you can dial a number from any module. It also can send messages via numeric and alphanumeric pagers.

Its Caller ID module, which loads separately from PerfectWorks, displays the name and phone number of all incoming callers. You can set the Caller ID module to notify you automati-



VISUAL APPEAL: From the spreadsheet, you can easily add one of the 84 chart types included in PerfectWorks.

sists on playing a .WAV file when the phone rings. Although you can't shut this feature off, you can force it to play a blank .WAV file.

During installation, PerfectWorks scans your system for America Online (AOL), CompuServe, Microsoft Internet Explorer, The Microsoft Network, and Netscape Navigator.

PerfectWorks - [test.wpw <WP>]

File Edit View Insert Format Arrange Tools Window Help

Times New Roman 12 pt Styles Left 125%

Like the spell checker and thesaurus, the Grammarly grammar checker is available in all modules. QuickCorrect only works in the word processing module. Like the spell checker and thesaurus, the Grammarly grammar checker is available in all modules although QuickCorrect only works in the word processing module. Like the spell checker and thesaurus, the Grammarly grammar checker is available in all modules. QuickCorrect only works in the word processing module.

	A	B	C
		Badgers	Opponent
1			
2	Southern Cal	24	17
3	Michigan	14	10
4	Ohio State	27	21
5	Iowa	42	7
6	Bowling Green	56	0

Like the spell checker and thesaurus, the Grammarly grammar checker is available in all modules. QuickCorrect only works in the word processing module. Like the spell checker and thesaurus, the Grammarly grammar checker is available in all modules although QuickCorrect only works in the word processing module. Like the spell checker and thesaurus, the Grammarly grammar checker is available in all modules. QuickCorrect only works in the word processing module.

MIX AND MATCH: PerfectWorks lets you combine documents. Here, a spreadsheet has been added to a word processing document.

cally on receipt of a call via a MAPI-compliant e-mail system or your pager.

Unfortunately, the Caller ID module can't use the incoming telephone number to display the caller's database record automatically, and the Caller ID module in-

After examining those applications, it places recently or commonly accessed online resources in a tab in the QuickStart dialog box, which appears when you start PerfectWorks or select New from the File menu.

You can jump to a resource by

selecting it from that tab. PerfectWorks includes the front end of AOL, which you can launch from the same tab. Despite all this connectivity, however, PerfectWorks doesn't have its own communications module, as does Microsoft

Works. As with ClarisWorks, you have to rely on Windows 95's communications utility, HyperTerminal.

The integration between modules is both powerful and simple. You can add one type of information, such as a drawing, into another, such as a spreadsheet, by clicking a button and dragging a window across the host document.

When you double-click on the embedded object, the menus and toolbar change to reflect those of the embedded module.

More streamlined than OLE 2.0, PerfectWorks' proprietary technology requires only icon-clicking and mouse-dragging instead of sifting through multiple layers of menus. If you want to integrate a file created by an external application, PerfectWorks supports OLE 2.0.

WIZARD-FREE

PerfectWorks lacks the automated simplicity of wizards, which Microsoft elevated to an art form in Works. PerfectWorks partly makes up for this shortcoming with QuickAdvice, which provides step-by-step instructions for basic chores.

PerfectWorks' lack of wizards and a report writer are ill-advised in a product aimed at small-business and home users. Beyond those shortcomings, though, PerfectWorks is unusually powerful for integrated software; has a simple, consistent interface; and provides excellent integration and connectivity capabilities.

PerfectWorks 3. List price: \$79. Requires: 8MB RAM, 8MB hard disk space, Microsoft Windows 95. Novell Inc., Orem, UT; 800-451-5151, 801-225-5000. Circle 418 on reader service card.

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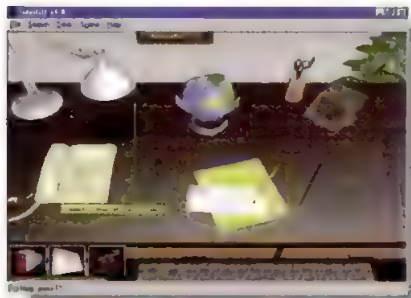
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INTERNET SOFTWARE

InterGO: The Easy and Safe Route to the Web

By Neil Randall

With all the hype surrounding the Internet, children are clamoring to get online, and parents and teachers are eager to make use of online resources for education. InterGO



CYBERDESK: InterGO's desktop icons provide easy access to all the necessary Internet tools.

Communications' \$49.95 InterGO is the first Internet kit designed specifically for this market, and though power users may find it limited, it succeeds as an easy-to-use, low-cost Internet solution.

InterGO's interface is reminiscent of the best features of Microsoft Bob. The program's main window is an attractive scene of a desk, with a few well-chosen icons on the desktop for accessing all the standard Internet applications. Click on the large telephone icon and InterGO connects to an Internet service provider if you don't already have one. A legal-pad icon and an envelope icon launch InterGO's e-mail client, and you can store frequently used addresses in the program's address book. An icon of a floppy disk case launches one of the easiest FTP clients you'll find, and the desk-lamp icon produces a Tip of the Day. The most prominent icon, a spinning globe in the shape of an apple, launches InterGO's surprisingly robust World Wide Web browser.

We found that the depth of InterGO's individual components ranged from good to excellent. The FTP program supports drag-and-drop for transferring files from local to remote sites and automatically scans down-

loaded files for viruses. The e-mail program offers nested folders and a filtering system that lets you route incoming messages into folders according to e-mail address or full name (but not subject line). The browser allows you

to preview the positioning and size of graphics while downloading so that you can decide which to view.

InterGO has integrated the applications seamlessly into the program's interface, leaving users free to concentrate on finding the right information or resources. In addition to the desktop, the company has provided

three different windows: Library, Newsroom, and Treasure Map.

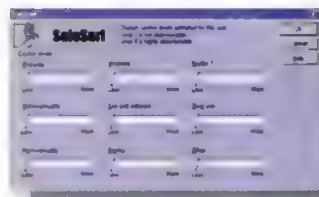
The Treasure Map is both a directory (called the Virtual Village) and a launching pad to the Internet. Click on "Takeoff," which is

an icon of the space shuttle, and InterGO launches the browser and transports you to a randomly selected site. There are also links to children's entertainment sites and an electronic mail.

Volumes in the Library are grouped by subject, including history, literature, news, references, sports, and so on. Access to reference works, such as the Columbia Encyclopedia and a World Atlas, on the company's servers is included with the purchase price. You can add URLs for other resources to the Library shelves as desired.

The Newsroom displays the current time around the world and provides "TV monitors" to view up to eight newsgroups, Web sites, or mailing lists simultaneously.

The program offers two different types of parental controls. KinderGuard blocks access to resources that are deemed inappropriate based on the age of the user and KinderGuard's user rating,



SAFETY SEALED: InterGO lets you select KinderGuard ratings and SafeSurf settings.

which can be anywhere from Early Childhood to Adults Only. You can also add your own ratings to URLs on a case-by-case basis. InterGO also supports a rating system called SafeSurf, which allows you to fine-tune parental controls in specific areas, such as violence, profanity, or nudity.

Whether you want a program that will help children get online or just an easy introduction to the Internet, InterGO is simple, full-featured, and safe.

InterGO. Estimated street price: \$49.95. Requires: 8MB RAM, 9MB hard disk space, Microsoft Windows 95. InterGO Communications Inc., Plano, TX; 214-424-7882; <http://www.intergo.com>. Circle 419 on reader service card.

PROGRAMMING

Learn Programming with Multimedia Cyber Classroom

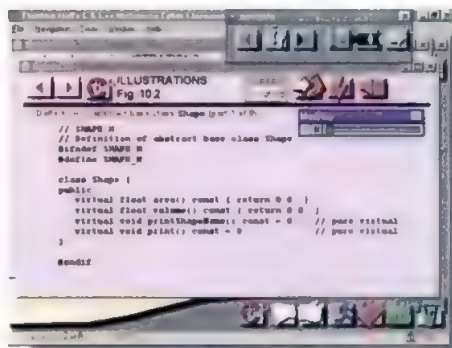
By Rick Rovegno

Prentice Hall Corp.'s \$69.95 C & C++ Multimedia Cyber Classroom is a fully interactive way to learn C and C++.

Cyber Classroom immerses you in the programming languages with 300 sample programs, 900 solved problems, and an index of 4,000 items hyperlinked to 12,000 references. You will see, hear, and try these out in step-by-step lessons.

Cyber Classroom guides you through these lessons with an assortment of icons. Click on the speaker icon and listen to key elements of the code sample. Then click on the lightning bolt, and the program executes the code. A separate window allows you to keep personal notes during the lessons.

What we liked best about this



PRIVATE TUTOR: Cyber Classroom's controls allow you to learn programming at your own pace.

product was the feeling of being in a classroom. If you get stumped by something in the textbook (the program's main window), ask the program's "professor" for a verbal description or a chalkboard example.

Some of the key elements that help build the fundamental skills include: common programming errors, good programming practices, software-engineering observations, and performance tips for optimizing system memory, increasing speed, and reducing the number of keystrokes.

Cyber Classroom is simple enough for anyone seeking to learn the basics of C and C++ but deep enough to benefit even experienced programmers.

C & C++ Multimedia Cyber Classroom. List

price: \$69.95. Requires: 8MB RAM, 15MB hard disk space, Microsoft Windows 3.11 or Windows 95. Prentice Hall Corp., Old Tappan, NJ; 201-236-7123; <http://www.prenhall.com>. Circle 420 on reader service card.

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CIRCLE 073 ON READER SERVICE CARD

Second Looks

LIVING WITH THE PRODUCTS WE REVIEW

By Brian Nadel



GRAPHICS

Graphics Accelerators Catch Up to Windows 95

WHEN WE LAST LOOKED AT graphics accelerator cards, the computing world was at the genesis of the Windows 95 era. The hardware may have been ready and willing, but the drivers were plagued by annoyingly low screen-refresh rates and under-

tion, 16-bit color, and a 75-Hz refresh rate on a Pentium/90 HP Vectra XU with 16MB of RAM.

Our tests show that graphics results—like many other computing tasks—are a mixed bag when running Windows 95. The good news is that on the Graphics WinMark 96 benchmark tests, all five of the cards we looked at showed improvement compared with last year's results. The biggest improvement was shown by the Millennium, which jumped 27 percent to lead the group at 27.9 million pixels per second.

This better graphics performance only translated into minor improvements in all-around system performance because the graphics adapter is but one of several major subsystems. For instance, the Millennium's ability to move pixels more efficiently boosted its Winstone 96 score by about 3 percent to a group high of 67.

Although Diamond's new driver for the Stealth64 improved the card's Graphics WinMark 96 score, its Winstone 96 score dropped by nearly 35 percent. Apparently, Diamond's driver is a work in progress that still requires further optimization; the company is readying an update.

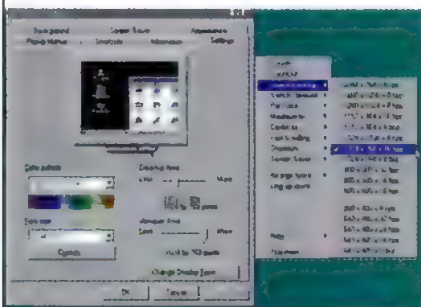
The numbers don't tell the whole story. For example, the Stealth64's drivers excelled in in-

tegration with the Windows 95 interface. Using the Display Properties sheet as the center for changing settings, the card was the only one of the five to offer on-the-fly adjustment of color depth and resolution without having to restart Windows.

In a similar vein, the WinTurbo's drivers include shortcuts to the Display Properties sheet, where you can customize refresh-rate settings and perform

color calibration. At the other extreme, the Graphite Terminator uses its Touch 95 control panel instead of the Windows 95 interface. The 9FX Motion 771 incorporates refresh-rate adjustment in the Properties dialog box but relies on Number Nine's Hawkeye utilities for adjusting color depth. The Millennium has all its tools in the Properties dialog box, but to check and change refresh rates, you have to use its PowerDesk utility.

Despite impressive growth in terms of performance, stability, and integrated features, there is much left undone. But frequent driver updates will continue to push performance, introduce new features, and further integrate with Windows 95.



ALL IN ONE: A right-mouse-click brings up the settings menu in the Stealth64's Windows 95 driver.

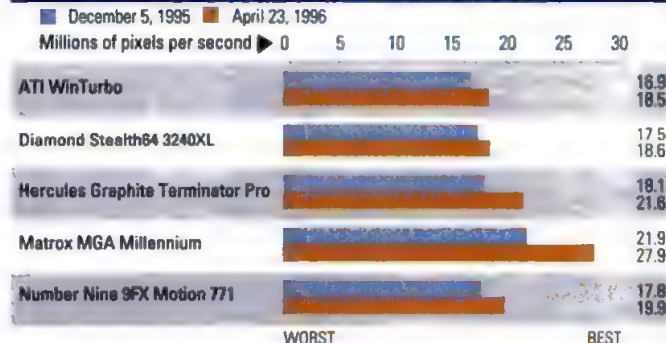
whelming performance ("Display Mates," December 5, 1995).

That was then. After testing five graphics cards with the latest drivers available, we think that the Windows 95 era of graphics is here in earnest. To see which cards have best adapted to Windows 95, we took another look at the following cards: ATI's WinTurbo, Diamond Multimedia's Stealth64 Video 3240XL, Hercules' Graphite Terminator Professional, Matrox's MGA Millennium, and Number Nine's 9FX Motion 771. Each card contained 2MB of memory, and testing mirrored the methodology used in "Display Mates": 1,024-by-768-pixel resolu-

ZD WINSTONE 96



ZD GRAPHICS WINMARK 96



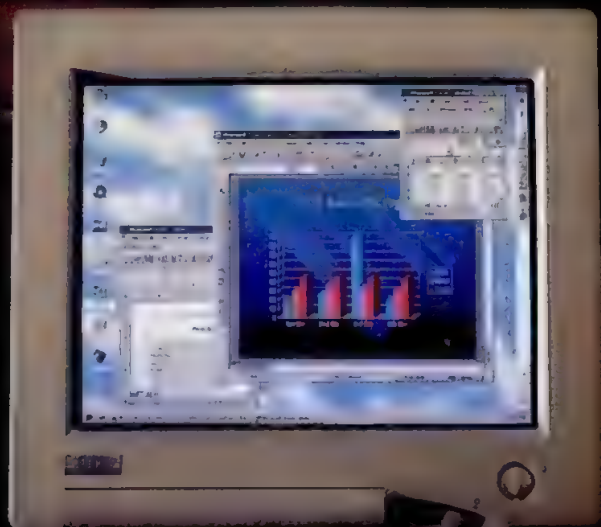
LOOKING AHEAD

Tell me what you love and hate about these products and we'll share the information in future issues. • Apple PowerBook 5300 • Color ink jet printers • EZ-SCSI 4.0

• Flowcharting programs • HP OmniGo 100 • IBM ThinkPad 780CD • Lotus Notes Release 4 • Multifunction peripherals • Partition Magic • Pentium Pro PCs • Quad-speed CD-ROM

drives • SoftWindows • Windows 95 utilities. Contact Brian Nadel directly via MCI Mail (556-1500) or CompuServe (72241,1616), or on the Internet at bnadel@zd.com.

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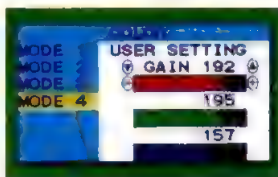
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1765GMe Monitor
June 1995



1765GMe Monitor
September 1995



1785GM Monitor
March 1995



1785GM Monitor
May 1995



New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Melissa J. Perenson

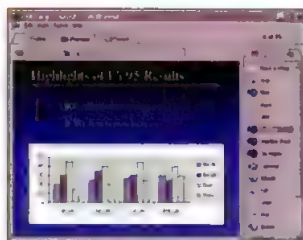
Presentation Graphics, ASAP

SOFTWARE PUBLISHING CORP. (SPC) is making it easier than ever to create graphically enticing presentations.

The \$99 **ASAP WordPower, Version 1.95**, is a 32-bit Windows 95 version of the 16-bit ASAP 1.02, which is also included in the package. WordPower takes your existing word processor documents and transforms them into presentation-quality visuals. WordPower uses SPC's "Intelligent Formatting" to adapt your text files quickly and painlessly into dynamically visual slides and reports. There are also drag-and-drop layouts and a selection of predesigned templates. Compatibility with Microsoft PowerPoint 7.0 lets you import your WordPower creations into a PowerPoint presentation. Download a trial version at SPC's home World Wide Web page, <http://www.spc.com>.

Meanwhile, if you're increasingly using the Web as a distribution medium, you'll find **ASAP WebShow for Netscape Navigator 2.0** a useful free Netscape plug-in. Also available for downloading from SPC's home page, WebShow is a presentation viewer that lets you view, download, and print WebShow presentations posted on the Web.

Software Publishing Corp., San Jose, CA; 800-336-8360, 408-537-3000; fax, 408-537-3500. *Circle 422 on reader service card.*



POWERFUL: WordPower 1.95.

Info Saver

ALSO STRIVING TO REINVENT the tried-and-true screen saver is Berkeley Systems' forthcoming \$40 **Digital Pet: Your Internet Companion**. Digital Pet provides you with an animated, interactive

pet dog that will help you navigate the Internet (unfortunately, Digital Pet will not fetch your slippers). The package's features include an Internet start-up kit from EarthLink, file-security options, programmable Usenet newsgroup retrieval, Berkeley's own World Wide Web search engine, Netscape Navigator 2.0, and Eudora Light e-mail.

Berkeley Systems Inc., Berkeley, CA; 800-344-5541, ext. 100; 510-540-5535; <http://www.berksys.com>. *Circle 425 on reader service card.*

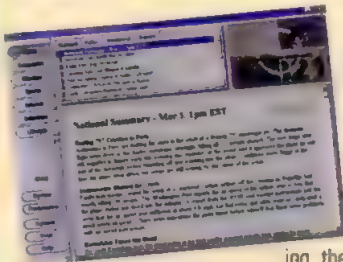
HOT PROSPECT

Channel Surfing, Internet Style

It was only a matter of time before the screen saver evolved to the next logical level. And given the runaway success of the Internet, it makes sense that this new breed of screen saver, led by PointCast's **The PointCast Network**, should combine the concepts of the screen saver and online news retrieval.

A free service, The PointCast Network "broadcasts" a fully customizable news feed directly to your desktop or Netscape Navigator 2.0. PointCast uses its proprietary SmartScreen technology to sense when your desktop is inactive and to determine when to invoke The PointCast Network automatically. While your system is not in use, The PointCast Network will start up and deliver up-to-date headlines, stock quotes, and sports scores to your screen. If a particular item catches your attention, simply click on the headline to view the full story. The PointCast Network utilizes either your dial-up Internet connection or your office's network Internet connection.

There are six "channel" topics of information offered via The PointCast Network, encompassing the following categories: company news, general news, industry news, life-styles, sports, and weather. **PointCast Inc.**, Cupertino, CA; 408-253-0894; fax, 408-253-1062; <http://www.pointcast.com>. *Circle 421 on reader service card.*



Coming into Satellite Range

TOSHIBA AMERICA CORP.'S latest addition to its Satellite notebook series targets the small-office/home-office market with a powerful feature set at a reasonable price.

The \$2,000 **Toshiba Satellite 100CS** features a 75-MHz Pentium CPU, 8MB of EDO RAM, and a 504MB hard disk. Also standard are a Type III PC Card slot and a nickel hydride battery.

The 6.9-pound unit features a 10.4-inch dual-scan color display that supports resolutions up to 640-by-480.

The Satellite 100CS is expandable to 40MB of RAM, and **PNY Electronics** is offering memory

upgrades for the notebook. An 8MB upgrade is priced at \$475, a 16MB upgrade costs \$900, and a



32MB upgrade costs \$1,775.

In other developments regarding notebook peripherals, Toshiba is offering an advanced video-capture card for notebook PCs running Windows 95. The \$399 **JK-VC2** provides full-screen, full-motion, 24-bit color video capture in a Type II PC Card; it's also compatible with notebooks fea-

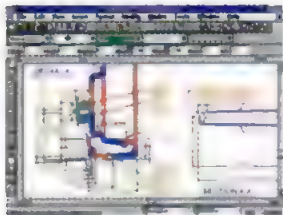


turing the Zoomed Video port. You simply connect your video camera to your PC and capture video as a Video for Windows file. You can capture and display NTSC, PAL, and SECAM video images at 640-by-480, 320-by-240, or 160-by-120, respectively, at 25 frames per second.

Toshiba America Corp., Irvine, CA; 800-334-3445 (Toshiba Satellite 100CS), 800-344-8446 (JK-VC2). *Circle 423 on reader service card.* **PNY Electronics Inc.**, Moonachie, NJ; 800-769-7079, 201-438-6300; fax, 201-438-9097. *Circle 424 on reader service card.*

Dimensional Twists

INTERNATIONAL MICROCOMPUTER SOFTWARE (IMSI) IS making a bid for the AutoCAD LT market with its latest version of TurboCAD. Priced at just \$100, **TurboCAD 2D/3D** includes TurboCAD 3.0 for Windows 3.1 and Windows 95, a standalone 3-D modeler, and 23 industry-specific libraries that comprise over 10,000 CAD symbols.



TurboCAD's improved drag-and-drop interface includes context-sensitive menus, handle-based editing, a CAD edit bar with on-screen locks and constraints, over 50 new drawing and editing tools, and a set of useful templates. You'll also find conveniently unlimited undo and redo features; support for an open, programmable API and OLE 2.0; and compatibility with AutoCAD, .DWG, and .DXF files.

A 30-day free trial version of TurboCAD 3.0 is available at IMSI's World Wide Web site, <http://www.imsisoft.com>.

International Microcomputer Software Inc., San Rafael, CA; 800-833-8082, 415-257-3000; fax, 415-257-3565. *Circle 426 on reader service card.*

The OS/2 PC Connection

IF OS/2 IS SIMPLY THE ONLY operating system you want to use on your new PC, consider buying a system from **Indelible Blue**. Though it is best known as the mail-order company that specializes in OS/2 applications, Indelible Blue is offering systems with hardware that is OS/2-compatible. There are four cleverly named lines within the series, including the Archimedes desktop PC, the Galileo mini-tower

PC, and the Pythagoras tower. The Heisenberg dual-processor tower, priced at \$6,285, features a Pentium/133 CPU with OS/2 SMP preloaded. The remaining lines start at \$1,599 and come standard with Intel Endeavor motherboards, 16MB of RAM, 256K of cache, and a choice of Intel processors from the Pentium/75 through the Pentium/133. OS/2 Warp comes preloaded, and all hardware is preconfigured for OS/2.

Indelible Blue Inc., Raleigh, NC; 800-776-8284, 919-878-9700; <http://www.indelible-blue.com/ib>. *Circle 427 on reader service card.*

Print Radar

AS MORE AND MORE NOTEBOOK PCs are sold equipped with infrared capabilities, companies are faced with the quandary of how to provide support for IrDA ports in conjunction with networked printers and desktop PCs that weren't designed with infrared in mind.

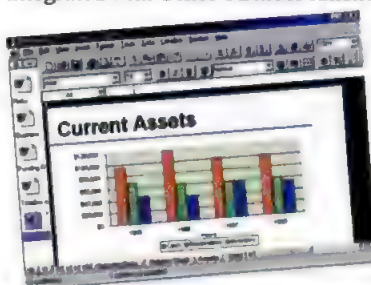
Extended Systems' **JetEye Net Plus** is a \$285 infrared adapter that provides a reliable, cable-

free means of connecting to the office network (there's support for NetBIOS, NetWare, and TCP/IP networks) and the local printer. Simply connect JetEye to your network, point your portable toward JetEye's infrared sensor, and log on; you can connect from up to 3 feet away. **Extended Systems Inc.**, Boise, ID; 800-235-7576, 208-322-7575; <http://www.extendsys.com>. *Circle 428 on reader service card.*



Office Planning Solutions

VILLAGE SOFTWARE, WHICH ORIGINATED SEVERAL OF THE spreadsheet and Binder solutions that shipped with Microsoft Office 95, has added to its line of template solutions with four new editions of **FastPlans**. Priced at \$99.95 each, the FastPlans series of add-ons is fully integrated with Office's Binder functionality.



PLANNING ON YOUR FEET: Village Software's Business Planning FastPlan.

The Business Planning FastPlan automates the writing of a business plan by linking Word-based business-plan sections with Excel-based number-crunching sections. The Meeting Organizer FastPlan uses a wizard to expedite the creation of Excel, PowerPoint, and Word documents for the purpose of meeting organization, planning, and reporting.

The Report FastPlan lets you create a customized business report in Excel, Powerpoint, or Word. And the Proposal and Marketing FastPlan helps you fashion sales proposals. **Village Software**, Boston, MA; 800-724-9332, 617-695-9332; fax, 617-695-1935. *Circle 430 on reader service card.*

BRIEFS

Books

Suffering from Windows 95 headaches? Look no further than **The Windows 95 Bug Collection**, an encyclopedic list of glitches from installation errors to hardware and software incompatibilities. Whenever possible, author Bruce Brown offers the reader ways to work around the bugs (\$14.95, Addison-Wesley, 800-447-2226) Keeping up with rapid changes on the World Wide Web isn't easy, but the second edition of Ian S. Graham's **HTML Sourcebook** can help. The new version covers HTML 3.0, the CGI standard, and

extensions to Netscape Navigator and Microsoft Explorer (\$29.95, Wiley & Sons, 800-225-5945) Want to earn a degree without leaving your living room? **The Internet University**, by Dan Corrigan, is a directory to online educational opportunities, including profiles of 30 organizations with degree programs and tips on academic uses of Internet tools (\$26.95, Cape Software, 508-432-2435).

Internet

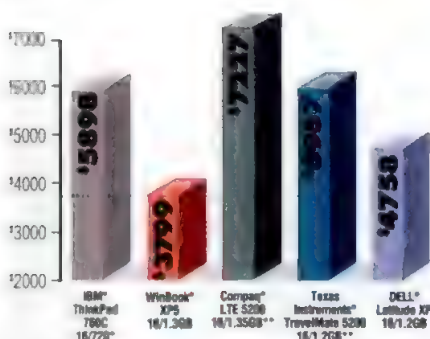
Sams.net is offering the \$35 **Plug-n-Play Internet for Windows, Version 2.0**, an-all-in-one

solution for accessing the Internet. This 32-bit package supports both Windows 3.1 and Windows 95 and includes FTP, Gopher, MIME-compliant e-mail, Mosaic, telnet, and a special version of NetManage's Internet Chameleon; you'll also find information on 100 preconfigured Internet service providers (800-223-2348) Logiccode's **NetKit** is a \$200 modem bundle that puts Logiccode's Quicktel V.34 28.8-Kbps modem together with a selection of Internet-access front ends offered by service providers; **The Internet Roadmap and Games on the Internet**, two

PENTIUM® CHIP, LITHIUM, 16MB, TFT, \$2999.



75MHZ INTEL® PENTIUM® PROCESSOR



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— PC Laptop Magazine, January 1996

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**Redefining
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- 420MB** high-performance Enhanced-IDE hard drive
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- Two 32-bit PCI slots
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- Designed for Windows 95
- Free three-year limited warranty for parts and labor¹

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- 1,000MB** high-performance Enhanced-IDE hard drive
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1. For details, call 1-800-351-3662. *Average U.S. street price. Monitor not included. **Other capacities available. HP Vectra PCs come with MS DOS[®] 6.2 and MS Windows for Workgroups 3.11 or Windows 95 for OS/2 or Windows NT included. First year on-site, 24-hour next day service. Second and third year return to dealer. MS DOS is a U.S. registered trademark and Windows and Windows NT are U.S. trademarks of Microsoft Corporation. Pentium and the Intel Inside logo are U.S. registered trademarks of Intel Corporation. OS/2 is a registered trademark of the International Business Machines Corporation. ©1995 Hewlett-Packard Company. PPG425

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- Integrated 16-bit audio and 4X CD-ROM
- Microsoft Windows NT 3.51
- Free three-year limited warranty for parts and labor¹

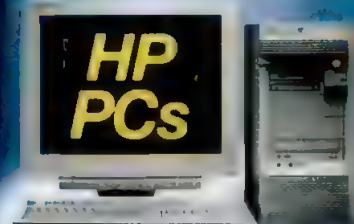
from **\$5,159***



HP Vectra XU 6/150

- Intel Pentium Pro 150 MHz processor with 256KB integrated cache
- 128-bit high performance memory architecture
- 16MB of DIMM memory standard, expandable to 256MB with 8 DIMM memory expansion sockets
- 1,000MB** Enhanced-IDE hard drive
- PCI Matrox Millenium graphics card with 3D acceleration and 2MB of WRAM, upgradable to 4MB or 8MB
- 7 mass storage shelves (5 front accessible)
- 6 expansion slots: 3 PCI, 1 PCI/ISA combo and 2 ISA
- Integrated 16-bit audio and 4X CD-ROM
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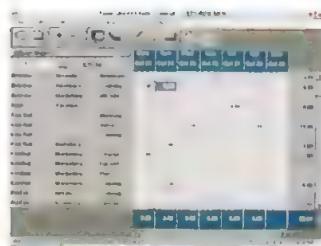
Call 1-800-322-HPPC, Ext. 1106,¹ for more information or the name of your nearest HP reseller. Or visit us at <http://www.hp.com/go/vectra>. For once, more *is* less.

The Time Trackers

IS KEEPING TRACK OF THE time you spend on various projects or jobs quickly becoming a headache?

TimeSlips Corp.'s **TimeSheet Professional 4.0 for Windows** (\$199.95 for a single user, \$699.95 for eight users) uses a familiar spreadsheet interface to help you track time and expenses for employees, projects, and clients. This new version features enhanced linking, reporting, and exporting functions and integration with Crystal Report Writer.

TEAMaker Corp.'s **Office Hours**, priced at \$149.95 per 50 users, lets you view an office's ac-



TIME OUT: TimeSheet Professional.

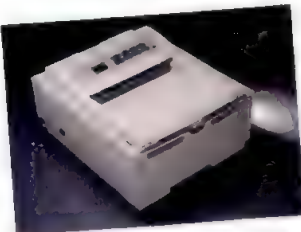
tivities across the network. The four simple components track employee comings and goings, productivity, billable jobs, and office events.

TimeSlips Corp., Dallas, TX; 800-285-0999, 214-248-9232; fax, 214-248-9245. *Circle 433 on reader service card.*

TEAMaker Corp., Beaverton, OR; 503-520-5050, ext. 214; fax, 503-626-2333. *Circle 434 on reader service card.*

Okidata's PostScript

OKIDATA'S NEW SERIES OF CROSS-PLATFORM ADOBE PostScript Level 2 LED printers satisfies both ends of the printer market without sacrificing power. Aimed at SOHO users, the \$1,439 **OL810e/PS** is rated at 8 pages per minute (ppm), has 600- by 1,200-dot-per-inch out-



PRINTER PS: The OL810e/PS.

put, and comes standard with 3MB of RAM. Also targeting the personal-printer market is the \$949 **OL610e/PS**, a 6-ppm unit with 2.5MB of RAM. The **OL1200/PS** is a networkable 12-ppm printer and includes 6MB of RAM standard and platform switching.

Okidata, Mount Laurel, NJ; 800-654-3282, 609-235-2600; fax, 609-222-5320. *Circle 432 on reader service card.*

Fight Back Against Boza

THE BOZA VIRUS, WHICH ATTACKS 32-BIT EXECUTABLE files and holds the dubious distinction of being the first Windows 95-specific virus to be isolated, took much of the antivirus industry by surprise. Most of the companies mentioned here have already posted the Boza-virus update on their World Wide Web pages.

Command Software's **\$170 F-PROT Professional for Windows 95** was one of the few antivirus programs that didn't need any additional patches.

Boza updates are also available for IBM Corp.'s **IBM AntiVirus 2.4**, McAfee's **VirusScan**, S&S Software International's **Dr. Solomon's Anti-Virus Toolkit**, Symantec's **Norton AntiVirus for Windows 95**, and ThunderByte Corp.'s **ThunderByte Anti-Virus Utilities, Version 7.0 for Windows 95**. **Command Software**, Jupiter, FL; 800-423-9147, 407-575-3200; <http://www.commandcom.com>. *Circle 435 on reader service card.*

IBM Corp., Somers, NY; 800-742-2493; <http://www.vrs.ibm.com/ibmav.html>. *Circle 484 on reader service card.*

McAfee, Santa Clara, CA; 800-332-9966, 408-988-3832; <http://www.mcafee.com>. *Circle 485 on reader service card.*

S&S Software International Inc., Burlington, MA; 800-310-9078, 617-273-7400; <http://www.dr Solomon.com>. *Circle 437 on reader service card.*

Symantec Inc., Cupertino, CA; 800-441-7234, 503-334-6054; <http://www.symantec.com>. *Circle 486 on reader service card.*

ThunderByte Corp., Massena, NY; 800-667-8228; info@thunderbyte.com; <http://www.thunderbyte.com>. *Circle 438 on reader service card.*

Multimedia Organizer

SOMETIMES IT CAN BE TOUGH to find an image or audio file on your 1GB hard disk, especially if the file is labeled with an arcane code name. North Coast Software's **PowerBrowser for Windows 95** is a \$49 multimedia catalog that makes it easy to organize your audio, image, and video files. PowerBrowser has customizable folders and thumbnails for pre-

viewing graphics files and information about the image; finding what you want is as easy as performing a keyword search. PowerBrowser, which is also available for Windows 3.1, supports CD-ROMs and other external storage media.

North Coast Software, Barrington, NH; 603-664-6000; fax, 603-664-7872; <http://cbix.unh.edu/ncs.htm>. *Circle 487 on reader service card.*

BRIEFS

books from Sybex; six popular modem-to-modem games; and more (805-383-2500) Planning on developing Internet-ready applications? Durand Communications Network is offering **MindWire**, a client/server software package that provides a platform for creating a dynamic multimedia online service, one that can be accessed via modem, network LAN, and the Internet (805-961-8700).

Monitors

Orchestra MultiSystems' \$995 **Tuba II** is a 17-inch monitor with a 15.9-inch viewing area, a

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*We can help with
of human*

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business trip
and shampoos.

to carry on
the overhead bin or
front of you.

to think the
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some parts
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*Ziff-Davis study, *PC Computing*, November 1994. Kingston Technology Corporation, 17600 Newhope Street, Fountain Valley, CA 92708 USA, (714) 435-2600, Fax (714) 435-2699.

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PC MAGAZINE CIRCLE 106 ON READER SERVICE CARD

Stimulation via Simulation

The electrical tower shook and vibrated as the wind increased. As it passed 120 mph, the deflection became visible. The power lines whipped with an unholy, subsonic resonance. As the wind increased to 150 mph, the tower began a weird, corkscrew-

ing dance. Power lines snapped. A triangular brace failed, and the tower bent in the middle, as if bowing. The engineer turned from her computer screen and said, "That's why we don't use that design anymore."

I've also watched a surgeon reshape a child's face, damaged by a tragic accident, by cutting and fusing bones. He viewed the effects of the reshaping with some dissatisfaction and tried again, this time far more pleased with the result. When it came time to do the operation, he had a precise set of measurements and coordinates to ensure that the operation would be as quick as possible, with minimal likelihood of further surgery. Both were simulations, and dramatic ones at that.

We do simulations all the time, but they tend to be far more mundane—changing an assumption on a spreadsheet or projecting growth. One of the very first applications for computers—ballistics tables—were simulations, too, in the sense that they were predictions of an artillery shell's trajectory based on a number of variables. The big difference between then and now is visualization. Plugging variables into an equation is straightforward, and it's no problem to run the equation for each brace and spar on the electrical tower until you exceed the material's strength. The pages of numbers, however, are not nearly as convincing as seeing the tower self-destruct.

I've lately been fascinated by programs that simulate electronic circuits. Electronic components follow a number of well-defined rules (Ohm's Law, Kirchoff's Law, and so forth). It wasn't until the mid-1970s, however, that researchers at Berkeley created SPICE, a generalized way of describing components and modeling their behavior. It took a decade before SPICE became widely accepted, and nearly another decade before someone came up with a PC-based front end to SPICE that lets you build circuits by dragging and dropping components, wiring them, and simulating their behavior right there on your screen.

The two big competitors are CircuitMaker (MicroCode Engineering, 801-226-4470) and Electronics Workbench

(Interactive Image Technologies, 416-977-5550), and they're truly amazing. They let you build analog or digital circuits, then watch them run. You might think that watching a circuit run is right up there with watching a refrigerator put the chill on a carton of milk, but this isn't the case at all.

You can actually hook up "instruments" to your circuits, measure voltages and current flow, and even see waveforms on a variety of analog and digital oscilloscope-like displays. You control the settings of adjustable components from your keyboard, and things happen on the screen. Lights wink on and off, digital displays flash. Bulbs and fuses actually "burn out" if you exceed their ratings. Analog circuits show you their frequency response and attenuation. Digital circuits behave according to the principles of Boolean logic, with the additional real-world effects of propagation delays and device loading.

I tested both of these programs over the past couple of weeks, and I'd be hard-pressed to choose between them. I like the drag-and-drop circuit building in Electronics Workbench better than CircuitMaker's menu approach. But CircuitMaker allows you to mirror parts as well as rotate them. Both programs could benefit from tear-off menus, so that users could choose the tools that they need rather than repeatedly burrowing through menus. CircuitMaker's wiring tool is definitely superior to Electronics Workbench's in terms of routing and the wires behaving the way you'd expect

them to, but both get the job done.

No computer is fast enough to model anything but the very simplest circuits in real time. Watching your circuit operate is much like watching a debugger step through your code. It may be a hundred times slower, but it gives you the assurance that the circuit will actually work.

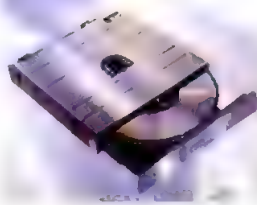
The educational potential of any simulation program is huge. Technical schools are embracing these products as alternatives to time-consuming wiring and senseless destruction of innocent semiconductors. The programs themselves make no claim to being educational, but there's a world of hands-on learning in store every time you fire one up. □



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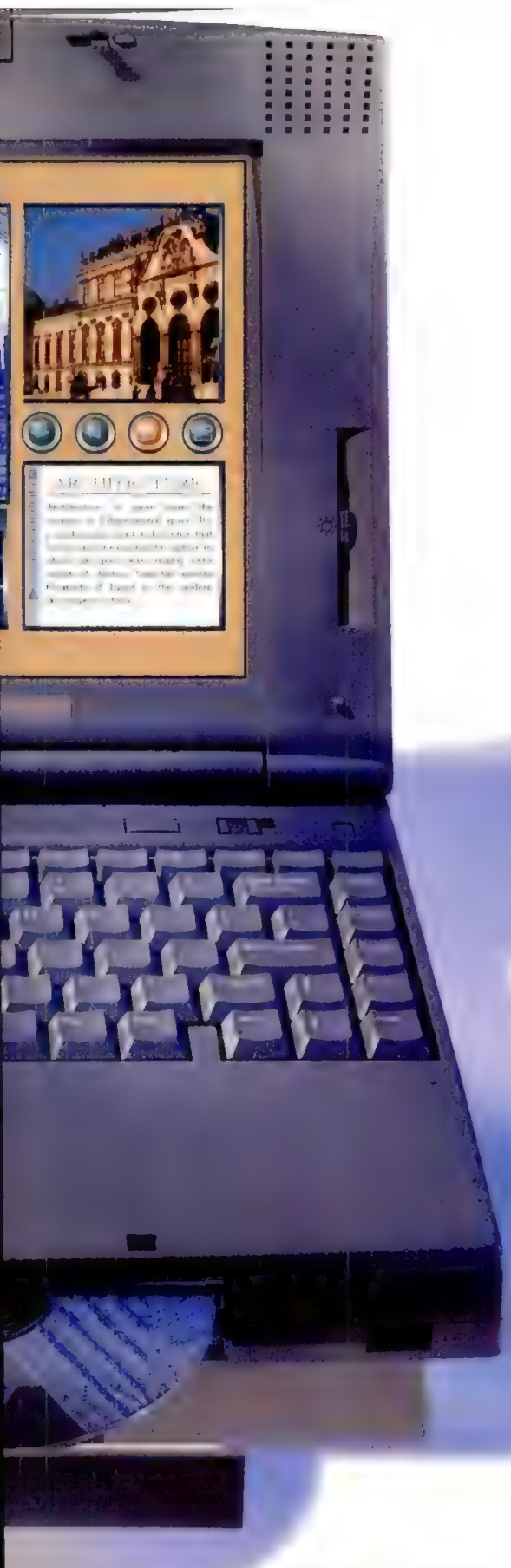


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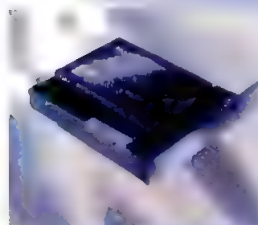


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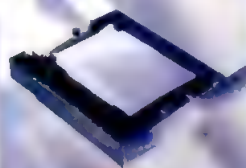
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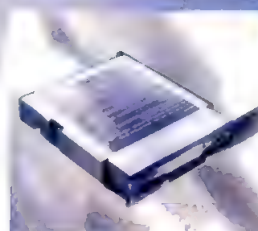
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Decency Act—Politics: 1, Internet: 0

As we all know by now, the telecommunications bill passed, and with it Senator J. James Exon's dubious Communications Decency Act, which makes it illegal to post an "indecent" message or picture. Conveniently, there is no definition of the term

indecent, so just about anything could be so deemed. Already, there are precedents for interstate policing. A Los Angeles-based World Wide Web page about birth control, for example, might be considered indecent in Arkansas, and the provider would be liable and possibly criminally prosecutable there.

Where's the Beef? Everyone is making a big fuss over the Communications Decency Act, but the most surprising aspect has been largely overlooked. The communications experts, Internet junkies, Web surfers, PC users, technologists, and pundits all knew this was happening a year ago. Last year, I wrote about the act's implications for online computing in *Inside Track* (May 30, 1995). Everyone was ranting on the Net and commercial online services about why the telecommunications bill was bad and how the Communications Decency Act was particularly onerous.

But after all was said and done, the telecommunications bill was passed by an incredible majority in both houses of Congress. Has anyone stopped to think that the entire online community, whose members wanted desperately to kill the decency provision, had what amounted to zero influence? Nada, zilch, bupkis. Surely the community of technocrats in charge of the online world—many of them millionaires—must feel frustrated by this turn of events. So much for grassroots politics. So much for the power of the Net. What power? There is none, and this proves it.

Milking the Problem. Another recent legislative debacle underscored just how out of touch Congress has become. This instance, according to a news report, involved a dopey effort by dairy special interests to pass a law requiring that gobs of dry powdered milk be added to regular milk (ostensibly to increase the amount of protein). A dairy spokesman claimed, "Our studies showed that this is what people want. They prefer this." Yeah, right. People want fresh milk, not a semisolid, processed concoction. The study was obviously bogus, yet the evening news took the bait and allowed the spokesman to ramble on without being challenged. Then a news report quoted an anonymous legislator, one of the bill's authors, who said arrogantly that "not

one word of this bill will be changed, and it will pass, period."

The point of this aside is that Congress seems more detached from reality than ever, and this is especially true when it comes to technology. At the same time, Congress appears to be more arrogant than ever. No wonder so few people bother to vote. So, too, with the telecommunications bill. This bill has been in the works for years and marched forward with virtually nobody but phone-company executives and their lobbyists calling the shots. Just like the dairy executives. But while you wouldn't expect this misguided but little-known dairy bill to encounter widespread opposition, fighting the telecommunications bill should have been easy with millions of Net users out there all able to communicate easily with one another. What a joke.

True Activists. All this brings to mind groups with real influence such as the Christian Coalition or Jerry Falwell's Moral Majority. Going back further, we have the AFL-CIO and the Teamsters. If the Teamsters, in their heyday, wanted a telecommunications bill stopped, how far do you think it would have gotten? These people knew how to do it right. They used a charismatic leader and targeted campaigns. Even in their current incarnation, the Teamsters would do a better job than the Electronic Frontier Foundation and their intellectual posturing.

Over a year ago, I posted an ad online for my Nikon F4 camera, but I never received any calls. Same thing happened

with an ad for my automobile. Why? Obviously, Net surfers don't get out much. Who needs a camera or a car when you spend all your time at a keyboard?

In fact, I believe serious cybersurfers fit exactly the stereotype fostered in the media. They're primarily guys who stare at computer screens all day, totally detached from society—a bunch of powerless whiners. They apparently did little to block the telecom bill but complain to each other. Now that it has become law, everyone is whining, shaking their fists, and threatening to sue. Too late—the Decency Act is set to steamroll everyone. But guess what? Get ready to hear a lot of complaining after the fact. It's pathetic.

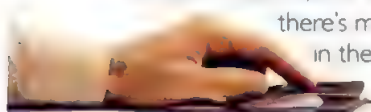


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Inside Track

Some thoughts on the DV Disk. By the end of the year a revolution in computing will begin as DVD devices hit the market. Or will it? I've predicted over and over that DVD will be a major success. But recently, as I began reading these same thoughts (although bordering on boosterism) in some "popular" home computer magazines, I realized **a critical second look** might be in order. Here are my latest thoughts on the future of DVD technology.

If It Works Dept.: First, if the DVD takes off as predicted, it will fundamentally change the computing landscape. Because of its read/write capability and **enormous capacity**, it could even threaten hard disk makers. Once the price of the DVD gets low enough, one could imagine a low-cost computer built solely around it for both mass and removable storage. This, in fact, may be the architecture of the much-talked-about **Sony PC**. When combined with a caching controller, a DVD-based system's performance could rival that of traditional PCs with hard disks. Companies such as Iomega, Maxoptix, Pinnacle Micro, and Syquest **have to be worried**. They are making removable media gear that will compete directly with the DVD. But hard disk makers may find their business challenged, too. As for CD-R (compact disk-recordable), **it's a goner** once DVD arrives.

If It Doesn't Work Dept.: Then again, it's conceivable that **the DVD will be a dud**. This is something never discussed. But, if you **look at the track record** for optical technology of this caliber, there is cause for concern. Let's start with the **pathetic** video laserdisk. This technology was boosted in the 1970s as a **revolutionary breakthrough**. It was going to make it possible to stamp out movies as if they were records. But years went by before working models were widely available and, by the time the technology was perfected, VCRs had already cornered the market. Now only movie junkies own laserdisk players. During the seventies, this disk was also promoted as a **godsend for computer users** as a data-storage device. This never came to pass. Then in the early days of multimedia, it was promoted as a peripheral to be used with and controlled by a multimedia PC. Even this concept **flopped**. Worse, the first disks manufactured suffered from **extreme laser rot** and were unplayable after less than 10 years. If DVD is any sort of success, the traditional videodisk player will end up a curiosity.

Another optical technology, the compact disk, was also a **less-than-remarkable success** when it was introduced. And CD-ROMs were even slower out of the gate. Years and years went by before they caught on. Then we have the read/write optical drives and the mostly **defunct WORM**

If the DVD takes off as predicted, it will change the computing landscape. Then again, it's conceivable that the DVD will be a dud. If you look at the track record for optical technology, there is cause for concern.

drives (write once, read many). These devices took forever to configure properly and some observers still wonder if the devices are at all profitable. How can we move from a mechanism that took years to perfect, such as a Tahiti drive, to the DVD so quickly? I will be amazed if it can be accomplished successfully. What is **more suspicious** is the fact that none of the technologies used in the DVD have shown up in any proprietary device in the interim. The closest is the Panasonic PD/CD, a 650MB phase-change optical read/write unit. This **doesn't even come close** to what the DVD promises to deliver. I should also note that the supporters of optical devices were telling me over a year ago that the 230MB optical drive would be replaced by a backward-

compatible 600MB drive by last Christmas. What gives?

Then there is the media itself. Will it work? Especially the read/write media. I'm amused at how Philips two years ago began promoting the latest and greatest in audio technology: **the DCC, or digital compact cassette**. It would record digitally but still play old analog cassettes, too. It was designed to kill the hopeless DAT that was derailed as a consumer product by **Congressional nit-picking over copy protection**. DAT has since become a broadcasting standard, and a few audiophiles keep it around. Anyway, this marvelous DCC technology was supposedly better because it could also play old cassettes, unlike a DAT. Unfortunately, **faulty media problems** during the rollout combined with a ridiculously high price to kill the technology. DCC is dead. DVD media must be even more complex than a cassette tape. And since the DVD can be used **digitally to copy movies** as well as CDs, we can expect Congress to jump at the behest of Hollywood and legislate some crippling technology, potentially ruining the DVD's potential.

Then there's the issue of this rush to market. Is it a good thing that every Japanese electronics company from Pioneer to JVC to Matsushita will be making DVDs? What happens if many of these units are rushed to market with slipshod engineering? **We have no idea whether the DVD can be mass-produced reliably.** Nobody has done it yet. It's all theory.

And finally, look how long it took us to switch completely from 5.25-inch to 3.5-inch floppy disks. Software vendors were the **slowest to change**, siding with the "installed base." The installed base of conventional CD-ROM drives is estimated at over 40 million. If you're making a CD-ROM, when are you going to change to a DVD? Maybe not for years. In other words, looking at the promise of DVD objectively along with the track record of similar technologies, **I have begun to develop some doubts.** □



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The Persistence of Information

I've been on the road plugging the idea of intranets since before we coined the word. Terms such as *in-house Web sites* and *private Webs* aren't as sexy as *intranets*, but they got the ball rolling—after a lot of explanation. These days, intranets are on the covers

of business magazines and on network-TV newscasts, which makes the job of selling clients on the idea a lot easier; *intranet* is becoming part of the vernacular.

But that still doesn't help people get the underlying idea: I still hear, "Isn't that just like electronic mail?" and "Is this like an el cheapo Lotus Notes?" Is it going to kill off Notes?" Ninety percent of the time, I broach the idea of an intranet in a meeting with senior corporate management. The MIS people get it, of course, and the end users are often way ahead of both MIS and management in understanding just how they'd use an intranet. But still, these two questions arise—often, from the people who have to sign off on the final approval for setting up an intranet.

Let me first give you my brief answer to the el-cheapo-Notes question. And then I will give you a somewhat longer answer to the broader isn't-it-just-like-electronic-mail query, which may help put intranets in context.

Notes isn't going away anytime soon. Notes and intranets can be complementary. Though eventually we'll see such rich implementations of intranet Web sites that Notes' sun will begin to set, for now Notes has no equal as a business tool. From its well-developed replication scheme to the depth of good Notes applications available, Notes keeps people focused and in touch. Despite a wonky interface and mediocre remote access, Notes works.

(Netscape Communications' acquisition of Collabra Share late last year should worry Lotus: The advantages of a familiar, innately cross-platformed, HTML-based Navigator front end on Collabra's back end are alluring, and the "Netscaped" Collabra product due later this year could slow Notes' growth.)

Now: What's so special and so important about intranets? I've been talking in speeches to business groups about the notion of *persistent information*. It helps explain why intranets are so important and what they can do for a company.

Much of the information we deal with is highly tran-

sient, things we need to remember only briefly. I need to remember for the next few minutes, hours, or days the name of the receptionist I met this morning at the front desk, that funny joke Mark told me last night, the time of my flight to Cleveland this afternoon, that I have to pick up

my tux at the cleaners on the way to the airport. But much of the information that comes to us is not fundamentally transient: It is things we need to know now and also to refer back to—quickly and easily—for some unknown period to come. That's persistent information.

Examples: the deadlines for these columns for the rest of 1996; that I'll be out of the country for the month of August and where and when I'll be at each stop that month; the birthdays of my family members and a few associates; the telephone and fax numbers of a few thousand clients, friends, and contacts; the rehearsal schedule for our concert in mid-May.

Though the period of time that information will remain relevant for me—and the urgency with which I need to get at it—varies widely, all that information shares one characteristic: I need to be able to find it when I need it. The information's importance lies in its perpetuity, and I need to honor that innate persistence in the way I organize and store the information, so I can find what I need when I need it.

If I stash that information in several places in several forms—phone numbers in a Rolodex-style file, fax numbers in WinFax on my desktop PC, travel schedule in a pocket appointment book, deadlines on a cheat sheet under my keyboard, birthdays in a list on my notebook PC—I'm going to have a hell of a time finding it. Especially in a hurry. Especially if *I'm not sure where the information is stored*.

And of course, it's hopeless to think that anyone else could find it—though people who work with me often need to look up that information as well, sometimes a lot more urgently than I do. Like when I'm standing at a pay phone in a distant airport yelling at them.

I could make multiple copies of some of that informa-



INTRANETS' EDGE

The notion of persistent information helps explain why intranets are so important.

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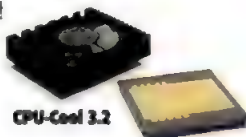


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JIM SEYMOUR

tion and spread them around. But persistent information often changes, so without some way of tracking and updating those copies, we'd never know which was the *current* version.

What if, instead, we stored a single copy of that persistent information in one place, where it could easily be updated and kept accurate; where any of us could access it electronically, 24 hours a day, from anywhere in the world; where we honored its inherent persistence by the way we treated it?

Ladies and gentlemen, I give you...intranets.

It would take this whole issue to tell you everything the clients in my corporate consulting practice are doing with their intranets—and the list would be obsolete long before you saw it.

WHAT'S ON YOUR INTRANET?

A few examples of what we've put up on their intranets lately will suggest the range: Project histories, frequently (and briefly) updated so anyone in the company can check the status of a project and newcomers can quickly familiarize themselves with a project's background. Health-insurance claim forms, as downloadable Adobe Acrobat files so everyone has the one he needs at his fingertips and so there's not a storeroom full of yellowing, out-of-date forms somewhere in the HR department.

Current (and constantly changing) production schedules for job runs. Employees' work schedules in a complex shift-work setting. A virtual-used-car-lot listing of workers' autos for sale. A lookin'-for-roomies page. Complimentary letters from customers praising employees. A reminder about sales restrictions on company shares received by employees as compensation and alerts on upcoming periods when shares can be sold by executives. Company telephone directories, cheaply produced and always current. Maps of company campuses. A WebCam's wide-angle view of the main playroom at an on-site child-care center for employees' kids.

Not all of that, of course, is persistent information: Taking a peek at your daughter in child care doesn't qualify—though it's a great idea. But much of it is, and that list, I hope, illustrates why both intranets and grasping this idea of persistent information are important.

The real question isn't, "What are other companies putting on their intranets?" but rather, "What are you putting on *yours*?" □



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My Top 20 Questions

Have you ever found yourself stymied while working at your computer because the hardware or software simply couldn't do something it really ought to? I'm not talking about features that would require breakthrough technology, for the most part.

Rather, a little common sense and solid design principles could go a long way in the computer industry. Here are 20 "how come" questions I'd love to pose to computer vendors. As in, "How come your product doesn't...?"

1. Why don't \$2,000 telephony PCs come with a blinking message-waiting light? It's a 99-cent part found on most \$49 answering machines. By the way, does anyone actually use the PC's answering machine?

2. Why can't we have smart cut-and-paste that knows enough to revert smart quotes, dashes, and other special characters (" ", or —) to something simpler that can be transmitted by e-mail programs?

3. Why isn't there a Windows successor to Lotus Magellan, the lightning-fast file indexer and viewer that is one of the 10 best utilities of all time?

4. Why can't ink jet printers be mounted on the wall to save space, the way toasters mount under kitchen cabinets?

5. When will vendors label the switches and ports of PCs, printers, and scanners in English rather than confusing icons? Can anybody actually see, let alone comprehend, the beige-on-beige relief molding inside your ink jet printer that supposedly shows you how to change cartridges?

6. When will vendors of consumer appliances, VCRs, microwaves, and so on include electronic (disk-based) versions of the user manuals that you could store on your PC's hard disk? How many of your appliance manuals could you locate if you had to today?

7. Why is Microsoft's Briefcase so obtuse?

8. Why can't Windows 95 networking be more friendly to infrequent network users? Why, for instance, couldn't it look around at boot-up (and maybe every 15 minutes thereafter), determine if other PCs or laptops are attached, and if so, automatically attach the devices and their drive mappings without any fuss? But if other devices are not there, why can't Windows 95 let it be? Don't send those multiple messages that read, "The following error occurred while connecting F: to \\LAPTOP\C: Permanent connection not available." Earth to Win 95: Does the computer name *laptop* give you a hint of why it might not be there all the time?

9. When will we see system buses faster than 66 MHz?

10. Will PC-based faxing ever work? Reliably and repeatedly, I mean. When you send a fax from a fax machine, you know it's going to go through. With a PC fax, you have about a 75 percent chance of getting through. That's not good enough.

11. And when it does work, why does a fax take twice as long to transmit on a PC as on a fax machine?

12. When will we see four-color ink jet printer/fax machine combinations? Lexmark's three-color Medley is a nice idea, but it's not quite enough.

13. Why does Version 2 of Rand McNally's TripMaker require a CD-ROM at all times? Version 1 didn't. Don't the developers want you to be able to use it on your laptop while traveling?

14. Why have kids' games gotten so preachy? If one step in a camping game requires cutting a tree for firewood or shelter, must the game always remind us first about deforestation, old-growth forests, and not messing with spotted owls?

15. Why do some games that run from your hard disk still require the CD at start-up? Isn't that just a form of key-disk copy protection?

16. Why has it taken makers of ink jet printers a decade to enable banner printing, which we finally have on the excellent, cheap new HP 680 series?

17. Why aren't the outlets on surge suppressors and UPSs spaced far enough apart so you can insert transformer bricks without covering two outlets?

18. Why don't modem, printer, and miniscanner vendors spend a few extra dollars to integrate the power supplies into the units? (Answer: They don't want to be bothered with certifying them for safety and emissions.)

19. How hard would it be to label the foam packing pieces "top left," "bottom right," and so forth? Some of us do repack our PCs, monitors, and printer boxes.

20. Why is it that so many Microsoft apps (Office and Bookshelf, for instance) bypass the Windows 95 interface and use their own always-on-top floating-menu bars? Memo to Microsoft: There's a difference between *important* and *self-important*. □



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work? Reliably
and repeatedly,
I mean.



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NETWORK EDITION

ASYNCHRONOUS TRANSFER MODE

ATM on the Move

The products are here, but their performance may not be what you expect. Like all technologies, this one carries trade-offs.



By Robert P. Lipschutz

It's game day for asynchronous transfer mode—you know, ATM. Forget about the potential, the predictions, the probable. It's time to look at some shipping products. That's what we did, and we got a healthy dose of reality as we tested five vendors' high-speed ATM adapters at PC Magazine Labs, West Coast. It was enough to make us say that you'll need to think carefully

ILLUSTRATION BY MARK VON ULRICH

INSIDE



We're just like you. We couldn't wait for ATM to get here either. We've wanted to get our hands on a bunch of shipping ATM products for a long time and put them into a comparative review. The results? Read on.

ROB LIPSCHUTZ, OUR TECH director for networking, headed up this coverage out at PC Magazine Labs, West Coast. Lipschutz and his team observed some encouraging interoperability among these adapters, but we also watched as each of these ATM 155-Mbps cards turned in performance no better than 20 to 30 Mbps when they had to deal with LAN Emulation. You pay a big price in overhead, it turns out.

ALSO, CHECK OUT THE FIRST LOOKS section that staff editor Sarah Roberts put together. First up are reviews of three Web-server packages. Lipschutz and author Ryan Tabibian review versions that work on Windows NT: The Internet Factory's Commerce Builder, Microsoft Internet Information Server, and Spry SafetyWeb Server. "SSL and ODBC" is the battle cry here. (Page NE33.)

NEXT, TECH ANALYST RUSS Iwanchuk reviews an innovative network management suite from Madge Networks called SMONMaster. This program allows simultaneous high-level RMON views of Ethernet, Fast Ethernet, FDDI, and Token-Ring traffic. Now you'll need to be running a Madge or LANNET switch, says Iwanchuk, but the payoffs are big. It's not inexpensive, only invaluable.

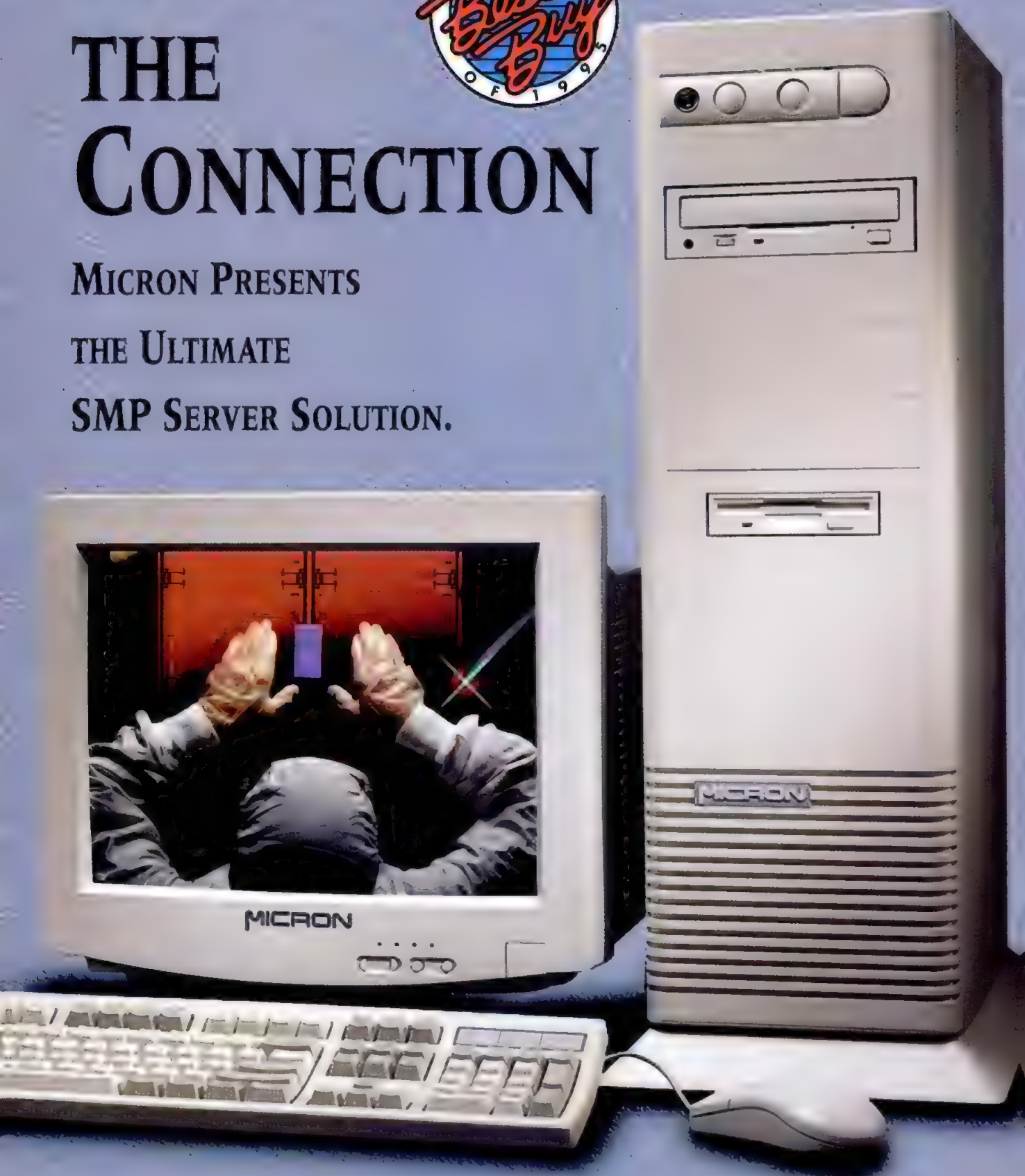
BACK AGAIN IN MULTIPLE ACCESS with more great productivity products for all you network managers is Steve Buehler, director of PC Labs, West Coast. It's tune-up time for your server. After all, summer is just around the corner. (Page NE48.)

—Gail Shaffer

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about whether ATM products make sense for your network today or whether you should wait a while.

We asked companies to send us their PCI 155-Mbps SONET adapters with LAN Emulation software for use with Microsoft Windows NT and, optionally, with NetWare 4.1. Five companies met the challenge with shipping products—Adaptec, Fore Systems, Interphase Corp., Olicom USA, and ZeitNet.

Like many high-speed networking solutions, ATM products can help you redesign your network, fix a performance problem area, or add bandwidth for a specific application. But like most nascent product groups, this one carries some interesting trade-offs. Surprisingly, we could coax only 20 to 30 Mbps of throughput out of these adapters using LAN Emulation under Microsoft Windows NT. (See our performance test results for more details.)

Some companies you might expect to see here did not make it in for various reasons. Digital Equipment Corp. got us an adapter, but a team from our Labs and Digital's technical support could not coax it to work with our desktop computers. IBM and Madge are both concentrating on 25-Mbps ATM and chose not to participate in this review of 155-Mbps adapters. Efficient Systems did not have a PCI adapter at this time, and Newbridge Networks Corp. did not submit any adapters for our review.

ATM: ALL THE MUSS

Much of the attention surrounding ATM is due to its ability to handle network data traffic right alongside time-sensitive video and voice streams. You can't do this as effectively with Ethernet or Token-Ring. But in reality, ATM today doesn't provide any such solution for integrated data, voice, and video networks because there is no method for such applications to talk to the ATM network effectively.

Most people who will buy ATM today will do so because it is on the path to the ideal network. It also provides some measurable improvements in data-only networks. Even bigger benefits will come later, when applications that use data, video, and voice start talking with the

RapidFire ATM PCI 155 Adapter

Although each of these five ATM adapters carries features that could recommend it, Olicom's

entry was the most polished and complete of all.

For starters, this adapter's installation went the smoothest—we installed it right out of the box with no problem. This was no small matter. We ran into extra steps or other issues with each of the other adapters. We grant that this may be expected with the first shipping products to implement a new technology. But that's what made Olicom's adapter stand out.

In addition, Olicom included driver software with the RapidFire: NetWare 3.x and 4.x, Windows 95, and Windows for Workgroups. No other card here covered us for that breadth of OSs. And Olicom's was the only adapter to include a

Token-Ring LAN Emulation client—and the services portion to boot—thanks to the company's ties to that market.

Finally, in our performance testing,

Olicom was right there running neck and neck with the adapter from Fore Systems, another acknowledged leader in this market.

The ForeRunner PCA-200EPC PCI Bus ATM Adapter earns an honorable mention.

This third-generation NIC from

Fore Systems interoperated well with every other card, worked with NetWare and Windows NT, and offered good utilities for help in troubleshooting. And its documentation includes good general information on ATM.



ATM network and are able to tell the network specifically what they require.

This new high-speed solution will find its way into networks both as a local ATM backbone and a workgroup solution. It works well, for example, for connecting a number of LAN segments, for high-speed server connections, or for connecting desktops and servers to high-speed ATM workgroups.

Among its many appeals, ATM has two things going for it: It can work at extremely high bandwidths (622 Mbps),

and its fundamental switched architecture is better than existing technologies for managing network bandwidth.

No matter what the technology, the challenge is to make the best use of bandwidth. One way to do this is to add bigger pipes, as you have been able to do for some time with Fast Ethernet and 100VG-AnyLAN. Another way is to manage the bandwidth

more intelligently, as in switched Ethernet.

ATM improves on both approaches. It provides a choice of high-speed options ranging from 25-Mbps and 155-Mbps

(SONET) adapters to 622-Mbps modules for ATM switches. And it has better bandwidth management than switched Ethernet or 100VG-AnyLAN. ATM uses virtual circuits to manage bandwidth allocation, and it can use multiple emulated LANs to segment traffic better. Although today there are no widely available methods for users and applications to talk directly to ATM, network administrators can use logical network assignments to give users and networks more bandwidth.

The 155-Mbps PCI adapters we tested form the fastest-growing segment in the ATM market. We tested these adapters using Pentium-class desktop and server PCs running Windows NT and NetWare using LAN Emulation, Version 1.0. We were surprised to find that we didn't see the high performance we expected from these adapters. Further testing showed us why: Today's networks are not yet ready for the high speeds of ATM.

We were pleasantly surprised, though, by the results of our interoperability testing. Adapters from different companies worked together! In the world of networking, that's pretty good for a technology that's just coming to market.

As with any network adapter, the features of these ATM adapters break down conveniently into a combination of hardware and software items. But with ATM, the software is more important. Remember that in today's Ethernet networks, it's

ATM has two big things going for it: It works at extremely high bandwidths, and its switching architecture is better for managing bandwidth.

Data Warehouse Comparison

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Scalable MPP Support	Yes	No Way	No
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Parallel Load	Yes	Yes	Yes
Parallel Index	Yes	No	Yes
Fault-Tolerant Parallel Server	Yes	Never	No
Parallel User-Defined Functions	Yes	Nope	No
Bit-Map Indexes	Yes	Yes	No
Star Query Optimization	Yes	No Way	No
Integrated Replication	Yes	No	No
OLAP/Multidimensional Support	Yes	Sorry	No
Video Storage & Playback	Yes	Nyet	No
Text Storage & Search	Yes	Not	Yes
Spatial Data	Yes	Never	No



Study held 6/16-9/1/95. Based on a census of the F1000 who are running UNIX and have a single DB ≥ 50GB. Source: IDC

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the network devices themselves—the routers, for example—that play a large role in the communication. So in Ethernet (and Token-Ring) networks, the adapters don't need much intelligence. With ATM, the end-user stations with the ATM adapters control the communications, so they carry more significant software.

ATM drivers and software deal with such chores as virtual circuit creation and traffic management. They provide the link between current LAN protocols and ATM networks as well.

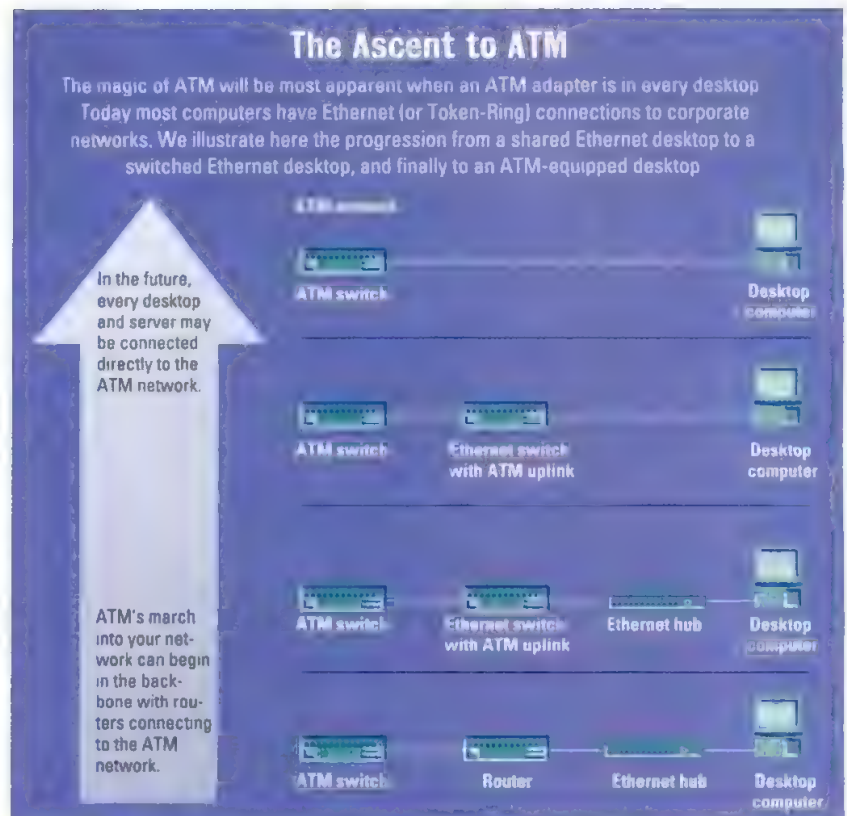
Some say that even though ATM products are shipping today, all ATM software is in most respects Beta code. We think this view has some merit, given what we observed in our testing. We found that even if vendors provided software floppy disks with the adapters, we usually had to download the latest version from a Web site. And it was not uncommon for new fixes to show up online from week to week during our testing. Interphase and Olicom units were the only products that worked seamlessly right out of the box. So if you're interested in trying out ATM, plan on spending a lot of time in the kitchen.

ATM: A TECHNOLOGY MAP

To be fair, there are in fact a few ways that ATM adapters can communicate with the ATM network today. In 1994, though, only proprietary methods were available, and companies such as Fore Systems developed proprietary software for ATM communication. The first standardized method for talking ATM was called Classical IP over ATM. It was defined by the Internet Engineering Task Force Request for Comment 1577.

This standard provided a way for applications and networks using TCP/IP to use ATM as the underlying infrastructure. Although this was useful for TCP/IP networks, it provided no way for alternative network environments such as NetWare (IPX) or Windows NT (NetBIOS) environments to work with ATM. This hurdle was overcome with the introduction of LAN Emulation, a standard that provides ATM compatibility with current networks. As a bonus, LAN Emulation also provides for interoperability among ATM adapters.

Not surprisingly, none of the ATM adapters we tested work with DOS, and only the Olicom adapter worked with Windows for Workgroups and Windows 95. We tested all of these adapters with the



more robust 32-bit OSs—Windows NT and NetWare. You need a robust and fast 32-bit OS to work under the rigors of ATM. In addition, the adapter vendors recommended that each of our desktop PCs have 32MB of RAM; we fitted our servers with 64MB.

On the hardware side, these adapters worked with either Category 5 copper cable or multimode fiber (MMF). We asked vendors to send us copper versions, and Adaptec, Fore Systems, and ZeitNet did. For vendors that offer both copper and fiber options, the ATM portion of the adapter is the same—only the lower physical-layer components are different—so the fiber and copper products should perform identically. We found that all these products require Pentium-class machines with PCI buses for acceptable performance.

The future is bright for asynchronous transfer mode, but we expect most people to wait for lower prices and more applications written directly for ATM. Still, today's ATM can fit nicely into your network, and we expect that on some distant day most networks will be filled with ATM. We will follow the emerging products closely over the next few years. Here's what's out there today.

Adaptec Inc.

Adaptec ATM155 for PCI

ALL REVIEWS BY
ROBERT P. LIPSCHUTZ

The king of SCSI has broadened its definition of input/output. Branching out into network I/O, Adaptec has made a significant move into the ATM adapter business. Although its biggest push is towards 25-Mbps ATM, Adaptec also sells a 155-Mbps adapter for both x86 and Sun SPARC platforms. We reviewed the Adaptec ATM155 for PCI and found it serviceable for ATM desktops. At \$895, it's not a bad deal either. (Adaptec also sells an MMF adapter for \$995.)

We tested the UTP adapter with a new release of Adaptec's LAN Emulation client software. We downloaded the software on its official release day—and ran into a few installation problems. Even so, its software configuration was a vast improvement over the previous version, in which users had to start the drivers manually in a DOS window.

Like the other adapters reviewed, Adaptec's is installed through the Network Control Panel in Windows NT. Adaptec's two-driver architecture, however, makes for a somewhat confusing installation. First, you give a placeholder TCP/IP address to the

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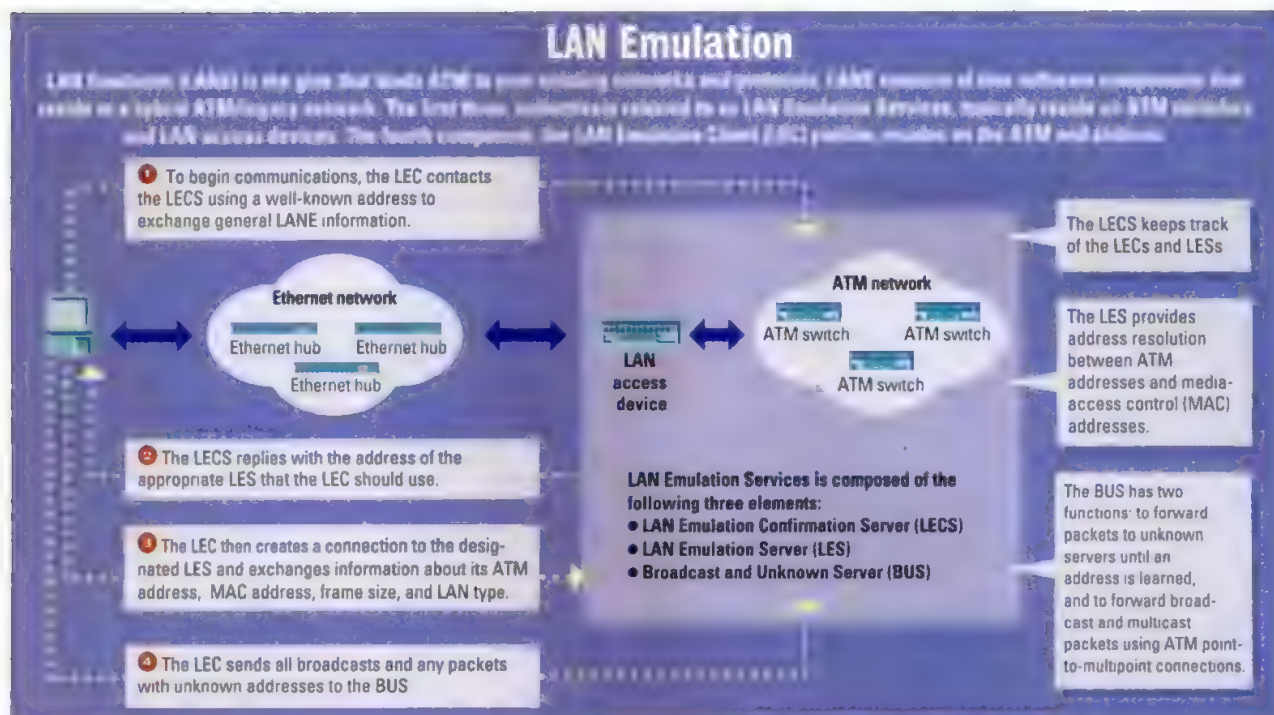
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standard driver. Then you install the new LAN Emulation portion of the software as a second adapter. This is the driver you actually need to configure correctly. Clearly there are still a few bugs to work through.

This adapter's performance lagged behind the others here, with a throughput of 14.2 Mbps on our two-client test. But the Adaptec was interoperable with the Olicom server adapter and the ForeRunner ASX-200BX. Signaling and LAN Emulation worked without a hitch.

Adaptec's LAN Emulation software currently supports Ethernet LAN Emulation with 1.5K and 9K MTUs. Each adapter can be a member of four emulated LANs simultaneously, enough for most clients but probably insufficient for a server adapter. Adaptec is working on a server adapter, to be released later this year.

The included software also works with classical IP over ATM (RFC 1577) for those networks that use TCP/IP. Classical IP normally performs better than LAN Emulation because it uses 9K blocks. Regardless of whether you use LAN Emulation or classical IP, the adapter currently

works only with Windows NT 3.51. Compatibility with NetWare, OS/2, and other NOSs is planned for later this year.

The Adaptec software includes an SNMP agent that complies with the current

draft of the ATM MIB. This software is installed automatically when the adapter is configured.

Adaptec hopes to leverage its reputation in the SCSI business with its jaunt into networking. Although its ATM adapter is not rich in features, it worked well in our testing.

Adaptec ATM155 for PCI.

List price: Copper,

\$895; fiber, \$995. Adaptec Inc., Milpitas, CA; 800-959-7274, 408-945-8600; <http://www.adaptec.com/networking/ATM.html>. Circle 951 on reader service card.

Fore Systems Inc.

ForeRunner PCA-200EPC PCI Bus ATM Adapter

Fore Systems has delivered on its promise to supply standards-based ATM products. (We reviewed Fore's earliest products in "ATM Comes to the

Fore," Network Edition First Looks, April 25, 1995.) The latest release of ForeThought—Version 4.0—complies with the ATM Forum LAN Emulation 1.0 and User to Network Interface (UNI) 3.0. In addition, for the first time Fore's ATM switches will work with any adapter that's in compliance with the LAN Emulation specification, and Fore adapters will work with any compliant ATM switch.

This is magic in the ATM community, because it signals a large step forward in ATM interoperability. Here we review Fore Systems' ForeRunner PCA-200EPC PCI Bus ATM adapter, a third-generation ATM adapter, with the new LAN Emulation code.

The Fore adapter performed best of the adapters we tested, coming in at 13.8 Mbps on our single-client test. (Remember that LAN Emulation carries significant overhead and that the Windows NT networking protocols are not optimized for ATM's high speeds.) We found the adapter interoperable with all others in the review, which is perhaps more important than performance.

We installed and tested the Category 5 copper version of the adapter, but an MMF fiber version is also available for \$1,195. Once we had the adapter in our Deskpro, we ran into the error message "I/O ROM Error." A Fore Systems technical-support staffer told us that the error would not affect our installation, and in-

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HAWK 2XL ST32155	2.147 GB	Ultra SCSI 8/16 bit	up to 40 MB/sec	5411	9/10.5
HAWK 2XL ST31055	1.050 GB	Ultra SCSI 8/16 bit	up to 40 MB/sec	5411	9/10.5

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PERFORMANCE TESTS

ATM Adapters



With each of these 155-Mbps ATM adapters, you'll pay a considerable throughput premium if you need to do LAN Emulation. In our testing, throughput was only about 15 to 20 Mbps. A faster server CPU can help, but not significantly.

What the Numbers Mean

Once you look at the throughput scores these adapters turned in, you might wonder why they're called 155-Mbps adapters and not 15-Mbps adapters. Our fastest performer, the ForeRunner PCA-200EPC PCI Bus ATM Adapter, ran at under 15 Mbps of throughput for a client-to-server connection. The reason is overhead. It turns out that the overhead of both LAN Emulation and Windows NT networking holds ATM back to these rather mundane performance results.

We further observed that the adapters' performance had no correlation to the amount of buffer RAM each had. It probably had more to do with the LAN Emulation implementation in software. We saw a wide spread in performance, with the ForeRunner coming in about 5 Mbps faster than our slowest performer, from Adaptec. As

we added a second client to the mix, our best performers, the Olicom and Fore Systems adapters, peaked at just below 20 Mbps, still far below what you might expect.

In some additional testing (whose results are not shown here), we found that adding clients did not increase the aggregate performance; that is, our faster server adapters still peaked at only 20 Mbps. Using just three clients, Windows NT Performance Monitor showed the server's CPU under full use, at about 95 percent. This accounts for the leveling-out in performance we observed.

To test the importance of the server CPU, we replaced our Pentium/66 with a dual-Pentium/133 server and attained a maximum of 30 Mbps. This is still not what you might expect, but probably the best you'll see using Ethernet LAN Emulation with Windows NT File Manager transfers.

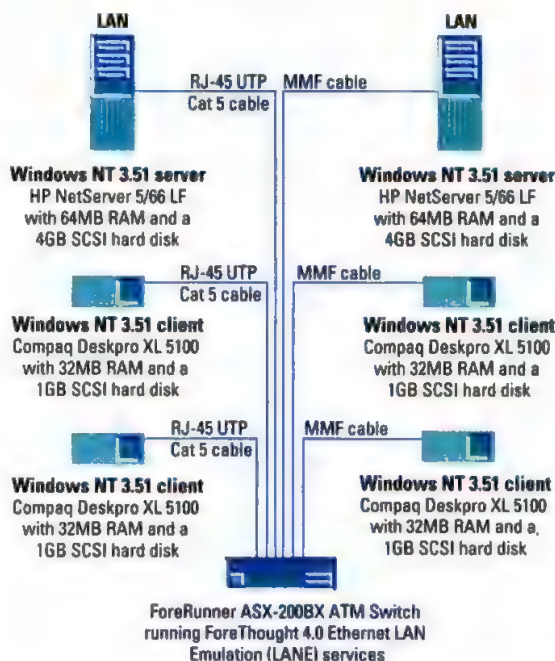
The conclusion for now: Use the fastest server you have, because your ATM performance is going to be limited if you need to use LAN Emulation. One trick we didn't try was to raise the Maximum Transmission

supported by the Fore Systems ATM switch.

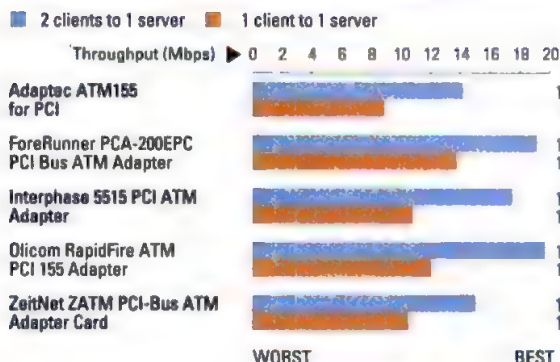
We used the NTFS file system for our Windows NT 3.51 servers and the FAT file system for our Windows NT 3.51 clients.

On our single-client file-

ATM Test-Bed



FILE TRANSFER



Unit (MTU) size in the LAN Emulation clients and servers (if they support it). The LAN Emulation standard allows for four sizes (1.5K, 4K, 9K, and 18K); the larger the size, the better the performance. But you won't be able to bridge Ethernet with ATM unless you stick with the 1.5K Ethernet maximum, and our Fore switch supported only 1.5K.

How We Tested

We used a ForeRunner ASX-200BX ATM switch as the backbone of our test-bed. Our Fore switch ran ForeThought Ethernet LAN Emulation (LANE) services. We used a 1.5K MTU, the largest size

transfer test, we copied a 48.75MB test file from the server to a client using Windows NT's File Manager. First, we copied the test file five times, to fill up the server's memory cache. On the sixth time, we used a stopwatch to measure the file download time. We ran the test three times on each product and averaged the results. We translated the test timings into file-throughput scores (test-file size divided by average timing) in megabits per second (Mbps).

On our two-client test, we ran the same transfer, but with two clients simultaneously. We report the total throughput of both clients.—Analysis written by Robert P. Lipshutz

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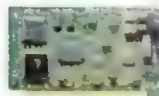
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Tomorrow Is Here Today: 25-Mbps ATM

By Steve Buehler

When ATM specifications were being worked on in 1993, one company—IBM—suggested a “user-speed interface” for the new technology. The goal was to develop a connection scheme that was much faster than Ethernet and Token-Ring methodologies, one that could be sold at reasonable prices and still run over the large, already installed base of Category 3 copper cable. Based on Token-Ring’s 32-MHz wire speed, IBM’s proposal included a 4/5 redundancy scheme that yielded a throughput of 25.6 Mbps.

After a slow start, a 25-Mbps ATM spec was finally developed, and a small but growing number of companies began serious work on delivering products. Now, three years after the groundwork was laid, the first products using this architecture are rolling out. They’re priced nicely between shared Ethernet and such true high-speed (100-Mbps) technologies as Fast Ethernet and 100VG-AnyLAN.

Many of the players in this market are focusing on building 25-Mbps ATM workgroups that get linked to a 155-Mbps ATM backbone, but some vendors have also added the path of easy migration from Ethernet. Madge Networks, for example, offers a line of adapters that connect to its Collage 280 Workgroup ATM Switch (\$7,795). The Collage 280 offers 12 desktop ports that auto-switch between 10-Mbps switched Ethernet and 25-Mbps ATM. The stackable architecture can yield as many as 144 ports.

ODS takes another approach: It focuses on 12-port ATM modules that fit into its Infinity line of hubs. The 1094-ATM25-12 module (\$7,200) is designed for companies that are staying with enterprise or backplane central-site hubs. ODS believes that some enterprise workgroups will migrate as needs arise and that the existing architecture should keep those leading-edge users happy.

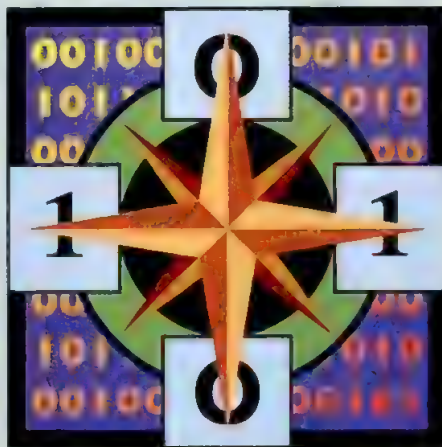
IBM recently announced a low-cost ATM 25-Mbps solution. The 8285 Nways switch, available with connections for 12, 24, 36, or 48 users and an optional 155-Mbps uplink, is available in packages with adapters for just under \$500 per

seat. This compares quite favorably with approximate per-port costs of \$2,000 for Fast Ethernet, \$1,000 for switched Ethernet, and \$250 for standard Ethernet.

Several other vendors are providing parts of 25-Mbps solutions, with more vendors announcing products each month. Products from such long-time ATM developers as ConnectWare, First Virtual, Interphase, and Whitetree are all part of the options available for pilot projects or for the increasing number of 25-Mbps requests for proposal (RFPs) that are being released by network purchasers.

THE DARK SIDE AND THE LIGHTER SIDE

The dark spot in this picture is the slow adoption of the technology and the lack of tools for analysis and setup.



Many companies are waiting to hear about proven interoperability and a complete production process before they make major commitments to 25-Mbps ATM.

Furthermore, few network tools are available as yet for 25-Mbps ATM. Such major network-analysis companies as Network General and Fluke have not yet committed to the same types of tools now available for Fast Ethernet or even 100VG-AnyLAN.

Don’t worry, though. The number of players and the number of products are sure to grow. Several companies have successfully implemented 25-Mbps ATM on the

desktop, where high bandwidth is a requirement. But while today’s CAD/CAM work-groups in automobile design studios and training programs in dental schools prove its feasibility, its rollout and acceptance will be slow.

And it’s unlikely that ATM 25’s costs will drop quickly in the near future: There’s still some engineering to do, chip volumes are low, and \$500 is a reasonable cost per seat for this level of bandwidth. But if you’re looking to make a strategic decision about replacing your organization’s current desktop machines, examine how you’ll connect those PCI-based Pentium-class machines you’re going to buy in the next year or two. For reasonable prices and more speed than most of your users will need, check out 25-Mbps ATM.

deed it didn’t. A Compaq BIOS upgrade fixed the problem.

Installation of the ForeRunner was similar to that of the Adaptec ATM155 in that we had to install two software-driver components in the Windows NT Network Control Panel: the ForeRunner PCA ATM Adapter driver and the ForeRunner ATM Ethernet LAN Adapter driver. We had the guidance of Fore’s excellent documentation, the best we encountered in this group. It contains clear, concise informa-

tion on general ATM concepts, adapter hardware and software configuration, and troubleshooting.

At review time, Fore did not include classical IP over ATM support with ForeThought 4.0. Classical IP is still available in ForeThought Version 1.2, though, along with ForeIP and SPANS. With each adapter, customers can choose between Version 1.2, Fore’s proprietary offering, and Version 4.0, the standards-based LAN Emulation offering. ForeThought

4.0 is available for Windows NT and NetWare, and Fore will add other OSs later this year.

Included with the adapter, Fore provides monitoring, troubleshooting, and logging tools. Under Windows NT, the Fore ATM Statistics icon is installed in the Control Panel; when invoked, the icon displays information about ATM connections with useful information about LAN Emulation status.

We found the LAN Emulation statistics

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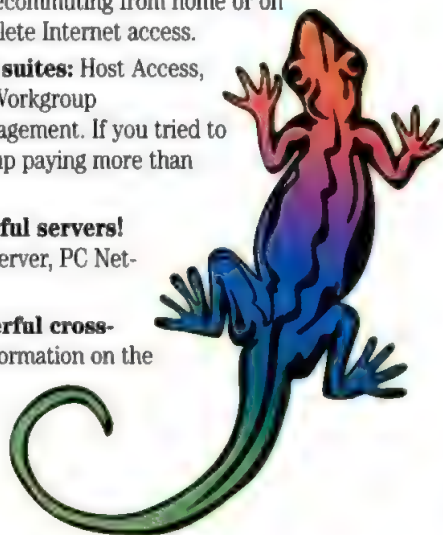
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It Does Get Better than This!

By Robert P. Lipschutz

Current applications and operating systems were not designed to work with connection-oriented ATM networks. Applications have no way to talk with the underlying network to communicate the need for the priority or bandwidth that ATM can provide. In addition, operating systems like Windows NT and NetWare are notorious for using broadcast packets, a surefire way to decrease performance on ATM networks.

LAN Emulation provides the interoperability layer between current applications and ATM networks, but it cannot take full advantage of ATM's potential to provide a higher quality of service. We've heard this characterization of LAN Emulation, and we think it fits: "The advantage of LAN Emulation is that the applications don't know they're running over ATM. The disadvantage of LAN Emulation is that the applications don't know they're running over ATM." For optimal ATM networks, operating systems should minimize broadcast traffic, and applications should be smart enough to talk with the underlying network.

The major operating-system vendors are working on this problem. Both Microsoft and Novell have announced plans

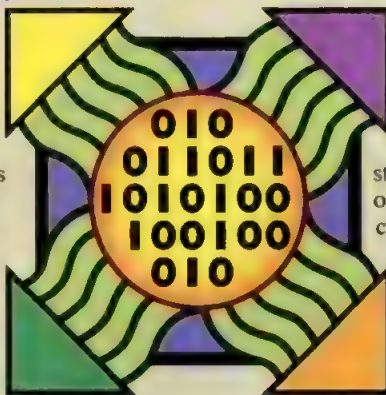
for connection-oriented abstraction layers. Microsoft has licensed code from Olicom, and Novell is working with Fore Systems. We expect to see some major improvements over the next year.

On the application side, the ATM Forum had been working on a standard ATM API that application vendors could use to write native ATM applications.

This effort has stalled a bit, and the ATM Forum is giving its full support to the WinSock 2.0 efforts. WinSock 1.1 provided a layer between Windows applications and the lower-layer network protocol stack, usually TCP/IP. WinSock 2.0 will go one step further by providing extensions for connection-oriented networks like ATM and ISDN. We expect each of the ATM adapter vendors to provide proprietary APIs as well.

Imagine having videoconferencing, broadcast video, and all of your e-mail arriving simultaneously at your corporate desktop. This is the kind of thing you'll be able to do over ATM.

In the next couple of years, we hope there will be de facto standards for application-to-ATM communication. Only then will ATM deliver on its grand promise.



helpful in troubleshooting the adapter. Under NetWare, an NLM called the Fore-Thought ATM Console displays the same statistics.

Fore Systems' LAN Emulation software was a top achiever on our performance tests and worked with the other adapters. Fore Systems' debut into LAN Emulation proved a promising one.

ForeRunner PCA-200EPC PCI Bus ATM Adapter. List price: Copper, \$995; fiber, \$1,195. Fore Systems Inc., Warrendale, PA; 412-772-6600; fax, 412-772-6500; <http://www.fore.com>. Circle 952 on reader service card.

Interphase Corp.

Interphase 5515 PCI ATM Adapter

This adapter struck us as the best value here for Windows NT desktop computers. With its low price (\$650 with copper cable, \$850 fiber cable), lifetime warranty, and acceptable performance, we could see buying a dozen or more.

The Interphase 5515 PCI ATM Adapter is also the best choice if you have some PowerPCs you need to con-

nect to the ATM network—the Interphase 5515 included software drivers for that Macintosh-friendly platform. We would not, however, recommend the Interphase 5515 as a server adapter, because it allows just a single ELAN per adapter; additional ELAN support will accompany the next version of the Interphase software.

As with many of the products in this review, we downloaded the latest software from the vendor's Web site. Installation followed the general pattern we'd run into with the other adapters: The network adapter and ATM signaling transport software install through the Windows NT Network Control Panel.

The Interphase 5515 offers a choice of three MTU sizes (1.5K, 4.5K, and 9K); for ATM-only networks, choosing the 9K option will improve performance. The Ethernet LAN Emulation Services resident on the Fore Systems switch work only with 1.5K MTU, but Interphase offers a Solaris-

based product that works with MTUs up to 9K. ELANs that bridge Ethernet and ATM networks must use a 1.5K MTU for compatibility.

The Interphase adapter's performance was similar to that of the others here. It came in at 10.8 Mbps on the single-client version of our test and 17.5 Mbps on the two-client version. Although not the fastest in this roundup, the Interphase 5515 would end up at the top of the heap in a price/performance index for the group. The adapters come standard with 128K of buffer RAM, but this can be increased to

512K (\$1,050). Adding buffer RAM can help the performance for some applications.

Here's another plus for Interphase: The company has a comarketing agreement with Bay Networks that matches Bay Networks' line of ATM switches and LAN access devices with the broad line of Interphase adapters, making for a complete

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emulated LAN
per adapter, so it is best
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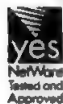
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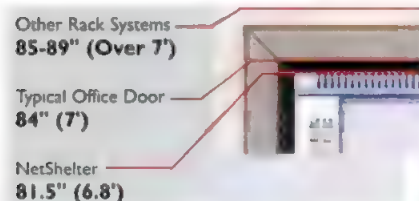
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See Chart Below Right			
3. CHOOSE SOFTWARE			
PowerChute for LAN (Novell, NT, Unix)			\$99-\$149
PowerNet Agent for SNMP-based NMS			\$169-\$219
PowerNet Manager (requires agent and/or adapter)			\$199-\$499
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PowerNet SNMP Adapter	AP9605	SNMP UPS management for 10Base-T	\$399
	AP9603	For 4 or 16Mbps token ring	Ask
Remote UPS Mngmt Device	AP9608	Remote UPS control via modem	\$159
Measure-UPS II	AP9612TH	Temp, humidity and external sensors	\$199
	AP9612T	AP9612TH without humidity sensing	\$149
Relay I/O Module	AP9610	Monitoring and control via dry contacts	\$179
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Measure-UPS Switch Kit	AP9813	Monitor cabinet access via Measure-UPS	\$99



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Rating	Part#	Runtime	Price
700	SU700RM	5	\$649
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2200	SU2200RM	50	\$1849
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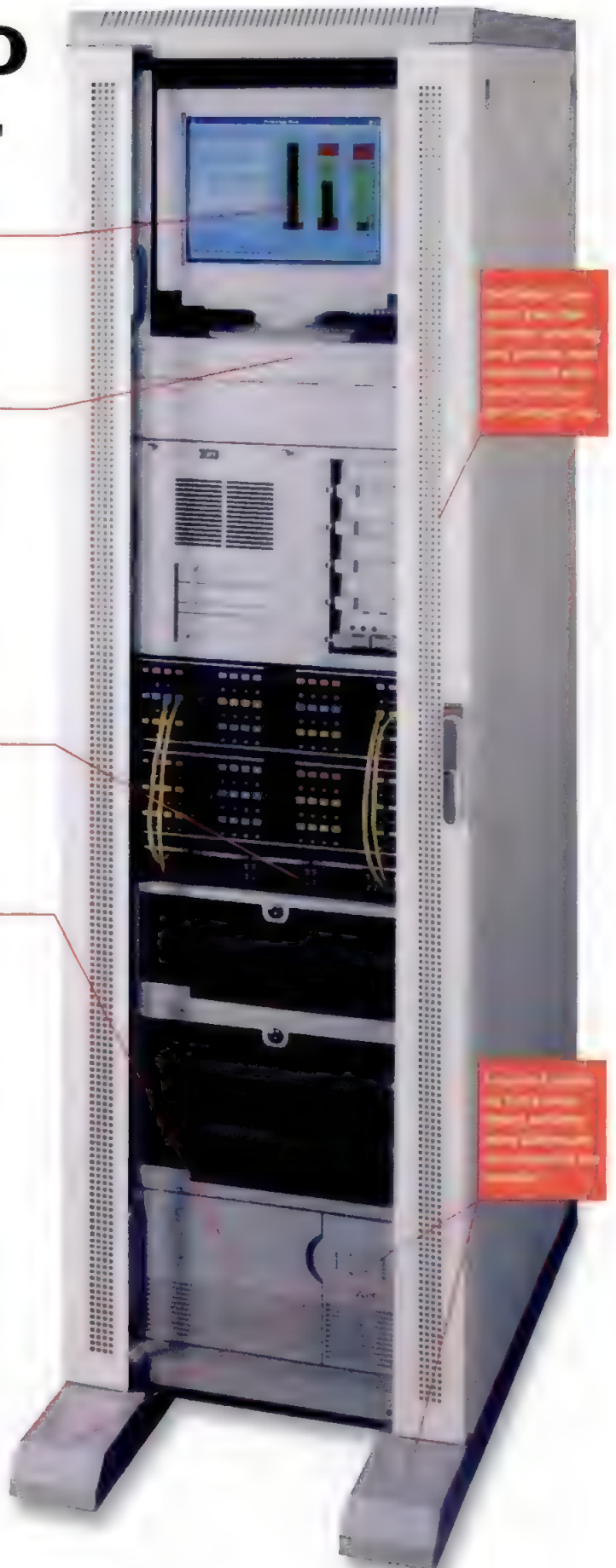
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ATM solution. This is an important selling point for customers looking for one-stop shopping.

Interphase plans to introduce Windows for Workgroups and Windows 95 software sometime this summer to accommodate a broader range of corporate client types. We believe these changes, along with a new line of ATM 25 adapters, will keep Interphase high on your list for desktop ATM.

Interphase 5515 PCI ATM Adapter. List price: Copper, \$650; fiber, \$850. Interphase Corp., Dallas, TX; 800-327-8638, 214-654-5555; fax, 214-654-5500; <http://www.ipphase.com>. Circle 953 on reader service card.

Olicom USA Inc.

RapidFire ATM PCI 155 Adapter

Olicom USA's RapidFire ATM PCI 155 Adapter is rather like the Swiss Army knife of ATM adapters. It has a first-rate collection of features and functions—the best here—and its hardware and software worked very well during our tests. In performance testing, the RapidFire was at the front of the pack and worked well with our ATM switch and other adapters. Moreover, of the companies in this roundup, Olicom is the furthest along with its product; it seems to have an answer to almost every problem. We were impressed—we named the RapidFire our Editors' Choice.

You begin to understand that this ATM adapter is different when you realize that it contains driver software not only for Windows NT (like the other products) but also for NetWare 3.x and 4.x, Windows for Workgroups, and Windows 95. We concentrated on Windows NT, but we did some additional testing using the NetWare drivers with equal success.

We installed the RapidFire software and attached our fiber cable to the SC connector. We observed that all of the fiber adapters in this review had the SC connector (now the most popular fiber connector type for adapters). At \$50 to \$100 per cable, make sure you order the proper fiber cables as you set up your ATM network. Olicom also sells an adapter for use with Category 5 copper (\$895 with a 128K buffer).

The software installation went very smoothly, a welcome contrast to our expe-

SUMMARY OF FEATURES

ATM 155-Mbps Adapters

	Adaptec Inc. Adaptec ATM155 for PCI	Fore Systems Inc. ForeRunner PCA-200EPC PCI Bus ATM Adapter	Interphase Corp. Interphase 5515 PCI ATM Adapter	Olicom USA Inc. RapidFire ATM PCI 155 Adapter	ZeitNet Inc. ZeitNet ZATM PCI-Bus ATM Adapter Card
■ YES ■ NO In alphabetical order by company					
List price	\$895	\$995	\$850	\$995	\$995
Warranty	5 years	1 year	Lifetime	3 years	1 year
Hardware					
PCI-bus architecture	■	■	■	■	■
Physical interface	Category 5 UTP copper cable	Category 5 UTP copper cable	SC multimode fiber	SC multimode fiber	Category 5 UTP copper cable
Buffer memory	512Kb	18K for transmitting, 106K for receiving	128Kb	512Kb	N/A
FCC class A-/B-compliant	■ ■	■ ■	■ ■	■ ■	■ ■
ATM Adapter Software					
Name and version	Base Driver 2.0, LANE Driver 1.0	ForeThought 4.0	Windows NT LAN Emulation SVC A05	CellDriver 1.0	ZNATM 3.0, ZNMUX 3.0
Minimum RAM required	16MB	16MB	16MB	16MB	24MB
Maximum ELANs per adapter	4	12	1	4	8
Supports SVCs	■	■	■	■	■
Provides statistics-viewing application	■	■	■	■	■
LAN Emulation Client					
Ethernet	■	■	■	■	■
Token-Ring	■	■	■	■	■
MTU sizes supported	1.5K, 9K	1.5K, 9K	1.5K, 4.5K, 9K	1.5K, 4.5K*, 9K*	1.5K, 4.5K, 9K
Supported Standards					
Supports classical IP1111 over ATM	■	■	■	■	■
Supports bridged Ethernet	■	■	■	■	■
UNI 3.0/3.1 signaling	■ ■	■ ■	■ ■	■ ■	■ ■
Compatible Operating Systems					
Windows NT 3.51 platforms:					
x86	■	■	■	■	■
Alpha	■	■	■	■	■
PowerPC	■	■	■	■	■
Windows 95 (NDIS 3.0)	■	■	■	■	■
Windows for Workgroups 3.11	■	■	■	■	■
NetWare 3.12/4.1	■ ■	■ ■	■ ■	■ ■	■ ■
OS/2 Warp Connect	■	■	■	■	■
DOS 6.22	■	■	■	■	■

N/A—Not applicable: The product uses system memory only.
*This MTU size is available for Token-Ring only.

rience with other products in this roundup. We installed it right out of the box with no stumbling blocks. As with the other packages, the software drivers install through the Windows NT Network Control panel. You might need to fiddle with one configuration file in DOS, but we used default parameters, so this file was unnecessary in our case. The documentation contained a bit of jargon, but overall it was informative and clear.

In addition to its wide array of operat-

ing-system support, Olicom's was the only adapter to include a Token-Ring LAN Emulation client. Because Token-Ring emulation services are not yet found in many switches (including Fore Systems' ASX-200BX), Olicom also includes the LAN Emulation Services portion with the adapters. Olicom's LAN Emulation Services run on a dedicated PC host.

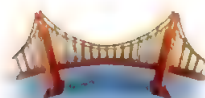
The only component missing from this version of software is classical IP over ATM. Olicom has concentrated its development

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COVER STORY

efforts on LAN Emulation for this PC adapter. The company plans to ship the classical IP driver for this adapter later this year.

We are not alone in being impressed with Olicom's implementation of software and hardware: Last August, Microsoft chose to license Olicom's ATM code for inclusion in Windows NT.

RapidFire ATM PCI 155 Adapter. List price: Copper, \$895; fiber, \$995. Olicom USA Inc., Plano, TX; 800-265-4266, 214-423-7560; fax, 214-423-7261; <http://www.olicom.com>. Circle 954 on reader service card.

ZeitNet Inc.

ZeitNet ZATM PCI-Bus ATM Adapter Card

The ZeitNet ZATM PCI-Bus ATM Adapter Card has plenty of user-configurable functionality, but we found a few glitches with the software that dampened our initial enthusiasm. We were able to work through those problems, though, and the ZATM PCI Adapter was certainly acceptable in our performance and interoperability testing.

The adapter software required 24MB of system memory—more than the other adapters in the roundup—partly because there is no buffer RAM on the adapter itself. The ZATM PCI Adapter uses the computer's memory for buffering packets. This might have been a reason for its lower performance test results. It finished fourth in our performance testing, just beating out the Adaptec ATM155 on the two-client version of our test.

The ZATM PCI Adapter does offer some useful software features. For example, each adapter can have eight simultaneous ELANs, making it a good choice for a server adapter. Only Fore Systems' adapter had more. And the software supports classical IP over ATM for connecting with other TCP/IP ATM clients.

We tested the Category 5 copper version of the adapter (an MMF version is available for \$1,095). After we installed the adapter, the installation of the software was a bit choppy. As with all the adapters in the roundup except Olicom's, two steps were required in the Windows NT Network Control panel, and the sequence of the steps can be a bit confusing.

Also, when configuring the adapter, we had to indicate the default LANE name expressly or an incorrect zero value was chosen, causing connection problems. We had some difficulties at first getting the adapter to work with our Fore Systems switch, but ZeitNet engineers were able to provide a patch that fixed some signaling-level timing problems that initially prevented the adapter from working.

ZeitNet's ZNAdmin exposes many ATM parameters through its GUI interface, and it was the most powerful utility we

saw in this roundup. We did not have occasion to use most of the parameters, but they could come in handy if you're configuring adapters with multiple ELANs and different cell rates. The utility reports some useful ATM and LAN Emulation statistics, and it even includes some simple diagnostics tests. When you're getting started,

you could spend a few hours just learning about ZNAdmin itself. Fortunately, the ZNAdmin functions are clearly described in the well-organized user guide.

The current release of software works with Windows NT and NetWare 4.1; ZeitNet says we'll see Windows 95 and Windows for Workgroups 3.11 driver support in late spring of this year.

ZeitNet offers a full line of 155-Mbps ATM adapters, including S-Bus and EISA. We expect that once the company tones up in a few areas, it will have one of the most powerful ATM software packages available. In fact, Cisco Systems already resells ZeitNet adapters as part of its complete ATM solution. □

ZeitNet ZATM PCI-Bus ATM Adapter Card. List price: Copper, \$995; fiber, \$1,095. ZeitNet Inc., Santa Clara, CA; 408-986-9100; fax, 408-562-1889; <http://www.zeitnet.com>. Circle 955 on reader service card.

ZeitNet's ZATM
PCI Adapter requires
24MB of system
RAM, but each adapter
can be a member
of eight simultaneous
emulated LANs.

ATM Workgroup Switches

Vendor	Product	Provides LAN Emulation services	Provides Ethernet LAN Emulation	Provides Token-Ring LAN Emulation	Supports ATM25/ATM155/ATM622	Sales Information telephone	URL address: http://www	Shipping
Bay Networks Inc.	Centillion 100	■	■	■	■ ■ ■	800-222-7611	baynetworks.com	Now
Cisco Systems Inc.	LightStream 1010	■	■	■	■ ■ ■	800-859-2726	cisco.com	By the time you read this
CrossCom Corp.	XLX ATM Switch	■	■	■	■ ■ ■	800-388-1200	crosscomm.com	By the time you read this
Fore Systems Inc.	ForeRunner ASX-200WG ATM Workgroup Switch	■	■	■	■ ■ ■	412-772-6600	fore.com	Now
General DataComm Inc.	GDC APEX-MAC	■	■	■	■ ■ ■	800-777-4005	gdc.com	Now
IBM Corp.	IBM 8285 Nways ATM Workgroup Switch	■	■	■	■ ■ ■	800-426-3333	ibm.com	By the time you read this
Newbridge Networks Corp.	Vivid Workgroup Switch	■	■	■	■ ■ ■	800-368-4843	vivid.newbridge.com	Now
3Com Corp.	ONsemble ATM 25Mbps Workgroup Concentrator	■	■	■	■ ■ ■	800-638-3266	3com.com	Now
UB Networks Inc.	GeoSwitch/155	■	■	■	■ ■ ■	800-777-4526	ub.com	Now
Whitetree Network Technologies Inc.	WhitetreeWS3000 Workgroup Switch	■	■	■	■ ■ ■	415-855-0855	whitetree.com	Now

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Customizable, intelligent install addresses user requirements	YES	NO	NO
Optimizes your network connections with advanced 32-bit TCP/IP VxD kernel	YES	NO	NO
Views, prints, converts documents and graphics without originating applications (KEYview™)	YES	NO	NO
Automatic network connection from the road or office (IP Switching)	YES	NO	NO
High-speed connectivity to anyone, anywhere (ISDN, X.25, CDPD)	YES	Partial	NO
Dynamic network connectivity with automatic router discovery and router fallback	YES	NO	NO
Advanced network troubleshooting tools keep you connected	YES	Partial	YES
Automatic scripting allows easy, one-click access to your most frequent connections	YES	NO	NO
Protects valuable data with Internet firewall support for your PC (SSL, SOCKS, ANS, others)	YES	NO	NO
Increases desktop flexibility by allowing you to run Netware applications over IP	YES	NO	YES
Seamlessly coexists with other enterprise networks (NetBIOS, Vines, IPX/SPX)	YES	NO	YES
Single vendor for host access, resource sharing, transport, Internet client and server with a worldwide sales and support organization	YES	NO	Partial

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First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

WINDOWS NT-BASED WEB SERVERS

The Web Rolls On

By O. Ryan Tabibian and Robert P. Lipschutz

The Web, it is a-changin'. Initially designed as a way for scientists to share information graphically, the Web has become the hottest thing since the personal computer was introduced back in 1981. Still, many challenges exist for using Web servers in business environments. As the importance of the Internet for businesses has grown, providing secure, interactive information, along with hooks to databases, has become paramount.

What is also changing is the platform of choice for running Web servers. Unix is still dominant, but Microsoft Windows NT is making great inroads. In these reviews, we look at the newest Windows NT-based Web Servers: CompuServe Internet Division's Spry SafetyWeb Server, Internet Factory's Commerce Builder, and Microsoft Internet Information Server. These offer not only simple HTTP service, but the needed SSL security and enterprise database connectivity. Also, Netscape has just announced two new servers—Netscape and FastTrack Server 2.0—and O'Reilly's Web Site Web Server is getting lots of attention as well.

Most companies now allow anonymous access to entire Web sites, which is fine for advertising and public posting of information. But businesses need a way to restrict external access on valuable information. The trick is user names and passwords across the network. Electronic commerce also

requires secure, encrypted communication and new techniques for dealing with credit-card information. And as companies begin to use HTTP internally for sensitive information, the traditional security provided by encrypted user names and passwords will become important.

The Internet Factory Inc. **Commerce Builder**

If you want a Windows NT-based Web server packed with features, which also happens to be affordable, then the second iteration of Commerce Builder (Version 1.5, \$995) is worth investigating. The Internet Factory has been working diligently since our last review of Commerce Builder ("A Site of Your Own," October 10, 1995). The package now comes in both Windows NT and Windows 95 versions.

The previous version of Commerce Builder included Secure Sockets Layer (SSL) security, powerful management tools, Chat Room, and Proxy Server, just as this version does. But a slew of new features that allow you to integrate Web sites smoothly with corporate databases have rounded out the product.

The first of these enhancements is a set of ODBC drivers, which simplify access to popular Windows-based databases such as Mi-

crosoft SQL Server. These drivers allow you both to integrate your HTML documents and to create Web pages dynamically, all with information pulled from your databases.

Also included with this server are support for Common Gateway Interface (CGI) scripting and Internet Server APIs (ISAPIs), a set of Microsoft APIs that simplify the creation of Web server enhancements using Windows-based development tools like Microsoft Visual Basic.

In addition, Internet Factory has rolled out its own scripting language—Server Macro Expansion (SMX)—with this version. SMX makes adding enhancements to HTML pages much easier, because you just write macros instead of having to write entire CGI scripts. Catalogue Builder, a new feature lets you put SMX to use to make a quick Web storefront with forms, pricing, and other useful elements.

We found that installing Commerce Builder was a snap. We installed it on a Windows NT 3.51 server and had the product up in minutes. The security portion is based on SSL, so as with SafetyWeb, you need to get a digital certificate before you can enable security. Commerce Builder's manuals were disappointing; they were the same as those distributed with Version 1.0.

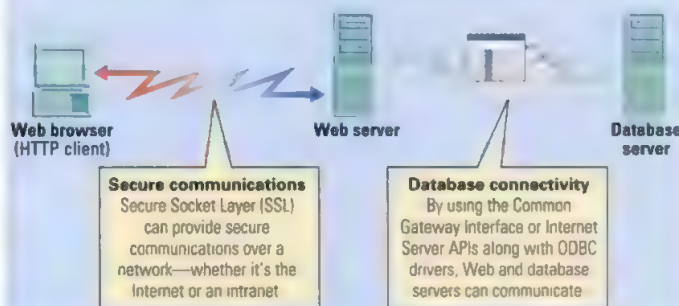
All management and configuration takes place using the tabular control-panel applet, which we found less friendly than SafetyWeb's management tool. But since the product installs as a Windows NT control-panel applet and is also a Windows NT Service, you can manage it remotely with Windows NT's remote-management tools.

Creating user databases under Commerce Builder is simple. You import users directly from the Windows NT database into Commerce Builder.

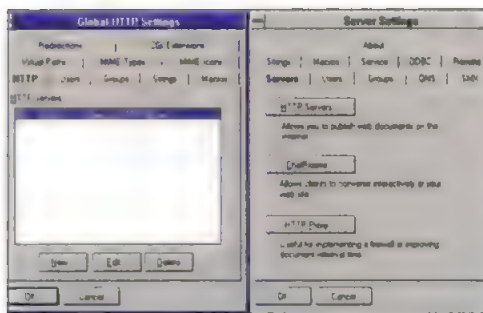
Web Servers Rise to the Challenge

The new generation of Web servers must handle two primary challenges: providing top-level security and database hooks. The servers we review have built-in Secure Socket Layer (SSL) capabilities for security and ODBC drivers to hook into internal databases. The importance of security is obvious—to keep your net-

work safe from intruders and to allow you to do transaction processing over the Internet. But hooks to internal databases are also valuable. Built-in ODBC drivers help you pull information gleaned from your Web server into internal databases, letting you easily compile reports on user demographics and usage patterns.



First Looks



SERVER SET-UP:

Commerce Builder provides you with clear instructions on server capabilities and tells you how to set them up.

Chat Room was one of our favorite Commerce Builder features, and there's nothing similar in SafetyWeb. Chat Room lets you create discussion forums on your Web server; it's similar to Internet Relay Chat, where the discussion is live. Furthermore, you can configure chat rooms to use SSL security.

Commerce Builder's built-in Proxy Server is also handy. We were able to create a list of sites that internal users could not access, which you can't do with SafetyWeb. Proxy Server also includes extensive logging capabilities, which you can use to analyze the usage patterns of internal Web surfers. This is great for companies that want to provide Internet access to all employees but don't want users to abuse the privilege.

Like SafetyWeb, Commerce Builder also includes a multi-hosting option. Using this feature you can create multiple Web servers with different IP addresses on the same machines. This feature has existed for Unix-based Web servers for a long time, but Commerce Builder and SafetyWeb are the first Windows NT-based Web servers to include it. Commerce Builder, like SafetyWeb, can log Web-server usage in either Common Log Format or Combined Log Format.

In addition to the \$995 Commerce Builder, Internet Factory also offers a free version of the server, the Communications Builder, which you can download from its Web site. The only difference between the two servers is that you don't get SSL security or Catalogue

Builder with Communications Builder.—*ORT*

Commerce Builder, Version 1.5. List price: \$995. The Internet Factory Inc., Pleasanton, CA; 510-426-7763; fax, 510-426-9538; <http://www.arisoft.com>. Circle 970 on reader service card.

Microsoft Corp.

Microsoft Internet Information Server

Though Microsoft's entry into the Web-server arena could certainly be called no-frills, there's no question that the company is armed with an architecture that's ready for growth. The recently released Microsoft Internet Information Server (IIS) offers the basics—Web, FTP, and Gopher services—on top of a Windows NT 3.51 platform. And though IIS doesn't include much in the way of Web-authoring, content management, or indexing tools, it does have a well-defined architecture for database and application integration and security.

Our biggest installation obstacle was downloading the software from Microsoft's Web site. After submitting an electronic registration form, you receive an e-mail message guiding you to the appropriate download site. We encountered a few hitches along the way but finally downloaded the 5MB of files. Microsoft plans to have a \$99 CD-ROM available by the time you read this.

IIS licenses and includes an implementation of the Secure Sockets Layer (SSL) specifica-

tion. By using restricted access managed through permissions, businesses can provide more valuable content online.

IIS provides basic logging but may not have enough functionality for sites serious about tracking usage. Each object hit is logged, along with the amount of data and the TCP/IP address. You can output log information to a text file or optionally to a Microsoft SQL Server. The text output does not conform to Standard Log Format, but a text conversion utility is included. The conversion utility will also add domain names for each TCP/IP address. No conversion utility is included for the SQL Server database.

For additional server monitoring, the Windows NT Performance monitor includes a new group for HTTP statistics. But when we tested a few of these parameters, we saw some incorrect information.

The next generation of Web servers will need to do more than just display HTML pages; they'll need to integrate well with existing databases. Currently, the Common Gateway Interface (CGI) is the standard way for Web Servers to run processes that talk with database servers. IIS has CGI support but also adds what Microsoft calls a more flexible and faster method—Internet Services API (ISAPI).

Microsoft includes a prototype ISAPI application—Internet Database Connector

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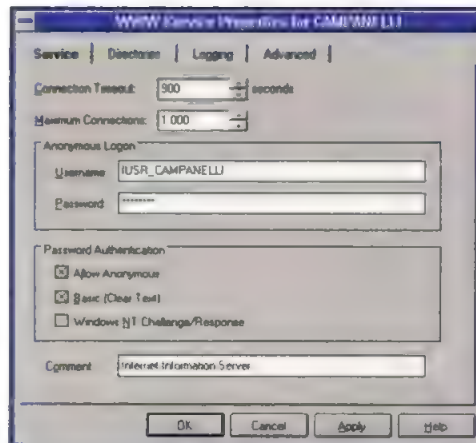
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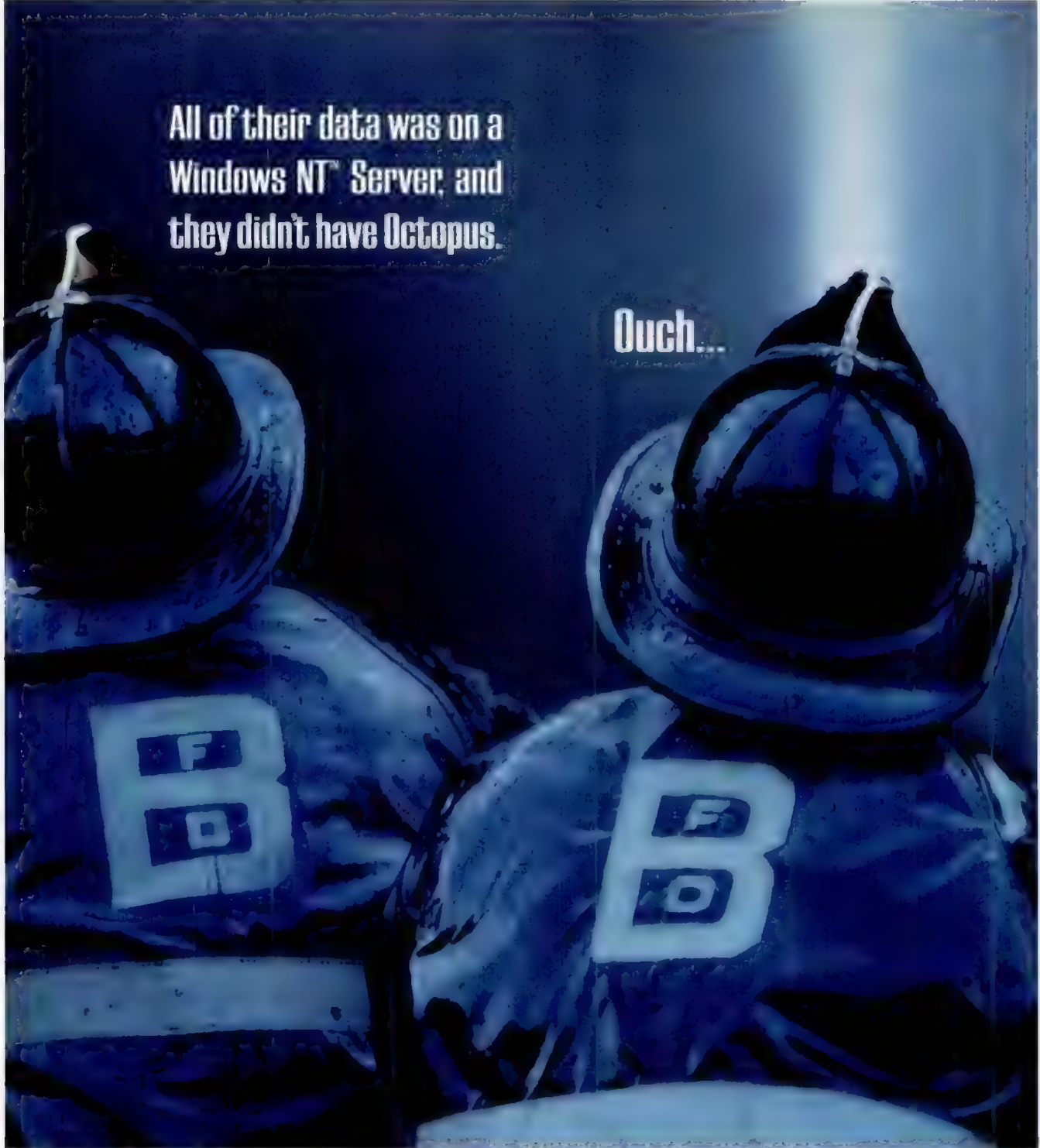
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Microsoft includes a prototype ISAPI application—Internet Database Connector

Each HTML document can be secured by user or group permissions, which is part of the basic Windows NT package. Although most Web servers today use wide-open anonymous access, this won't always be the



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First Looks

(IDC)—that works with ODBC drivers to attach to database servers. Microsoft includes the ODBC driver for its own SQL Server, but for other vendors' products, you'll need to use their ODBC drivers.

This first version of IIS shows Microsoft's intent in the Web-server arena. The company will work with existing standards like CGI and SSL, but will attempt to increase functionality through its own methods, such as ISAPI.

Microsoft believes that a Web server is just an extension of the operating system, and IIS does indeed use the underlying Windows NT architecture and user management. Though admittedly a good first effort, IIS needs many more features to use Windows NT's power fully.—*RPL*
Microsoft Internet Information Server, Version 1.0. List price: From Microsoft's Web site, free; CD-ROM version, \$99. Microsoft Corp., Redmond, WA; 800-426-9400; fax, 206-936-7329; <http://www.microsoft.com>. Circle 969 on reader service card.

Spry, CompuServe Internet Division

Spry SafetyWeb Server

Since the beginning of the Internet revolution, Spry has been known for providing desktop tools for connecting to the Internet. Now the next step has been taken. The company, recently acquired by CompuServe, has finally released its long-promised Web server—Spry SafetyWeb Server. It lives up to much of its prerelease hype by offering an easy-to-use server with built-in database connectivity and security at a reasonable price.

We tested the Microsoft Windows NT version of SafetyWeb Server (\$1,295). It also comes in BSDIA, HP-UX, SGI IRIX, and Solaris 2.4 variants. SafetyWeb Server has the distinction of being one of the few non-Microsoft products to carry the Microsoft BackOffice Seal.

One of the product's most

useful features is its included set of ODBC drivers. These let you easily link the server with popular databases like Microsoft Access. And prepackaging the drivers eliminates the need for complicated Common Gateway Interface (CGI) scripts to add database connectivity to Web sites.

SafetyWeb has other excellent features as well: Secure Sockets Layer (SSL) security, multihosting for setting up multiple Web servers with different IP addresses on the same server, a proxy server, and Internet Office Pro, a suite of desktop tools.

The package also includes Architext Software's Excite search engine and SoftQuad's HoTMetal PRO HTML editor. With Excite you can quickly create search engines for your Web site, and HoTMetal lets you create Web pages without manually adding HTML tags. HoTMetal is limited, however. Really best for novice users, it doesn't support some of the advanced HTML options, such as varying font sizes and scrolling text.

We installed the SafetyWeb Server on a Windows NT 3.51 Server and found the process simple and straightforward. Basic installation and configuration took only a few minutes, but configuring the security portion of the server was more complicated. Like Commerce Builder, it required a digital certificate from a certification authority.

Once installed, the server impressed us with both its functionality and ease of management. With the graphical management utility, you can centrally manage all aspects of



Gail Shaffer

Crosstalk

“Frank, we shouldn't let our readers believe that Microsoft's new Internet Information Server is in real competition with Commerce Builder or SafetyWeb. We reviewed it because it's new and it's Microsoft, but Information Server is training wheels for the other two products. Microsoft has announced an upcoming version of Information Server that will be bundled for business, but companies that want to do Web business now can't wait!”

“You're right, Gail. While Microsoft develops this product, Internet years are flying by. Readers shouldn't skip over the ability of these products to act as proxy servers either. This technology lets you bring in only those Web sites that relate to your business and keeps your employees out of the land of the barbarians—and vice versa.”



Frank Derfler

the server, including setting up security, creating multiple servers, and setting port numbers from a single console.

Also, the server was well integrated with features within Windows NT. For example, you can add Web-server statistics to the Windows NT Performance Monitor and view critical Web-server information, such as total transactions and maximum concurrent sessions.

You can also manage SafetyWeb remotely from any Windows NT or Windows 95 machine on the network. But unlike Netscape Commerce Server, you can't manage SafetyWeb from anywhere on the Internet.

SafetyWeb does not take advantage of the Windows NT user database. It requires you to create users manually instead of importing them from the Windows NT database as you can

with Commerce Builder.

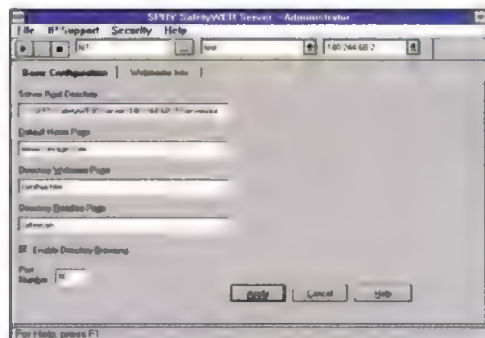
One of SafetyWeb's best features is Proxy Server, which lets you tighten security by providing a single point of entry and exit for your network. SafetyWeb, however, cannot create URL filters that deny internal users from accessing certain sites.

Several logging options come with SafetyWeb. You can create a log file in either the Common Log format or the more recently released Combined Log Format, which can gather more critical data.

With Combined Log Format, you can collect information such as *referrer*, the URL of the server that the visitor comes from, and *browser*, the type of browser and operating system the visitor is using. Thanks to the ODBC drivers, you can import any of these logs directly to a database for easy manipulation and reporting.

Spry Web Server, a free version of this product, can be downloaded from the Web. The freebie, however, doesn't include SSL, Excite, HoTMetal, or Internet Office Pro.—*ORT*

Spry SafetyWeb Server 1.0. List price: \$1,295. Spry, CompuServe Internet Division, Bellevue, WA; 800-447-2971; fax, 206-557-6000; <http://www.spry.com>. Circle 968 on reader service card.



SAFE SETTINGS: The management tools built into SafetyWeb Server are highly functional and easy to use.

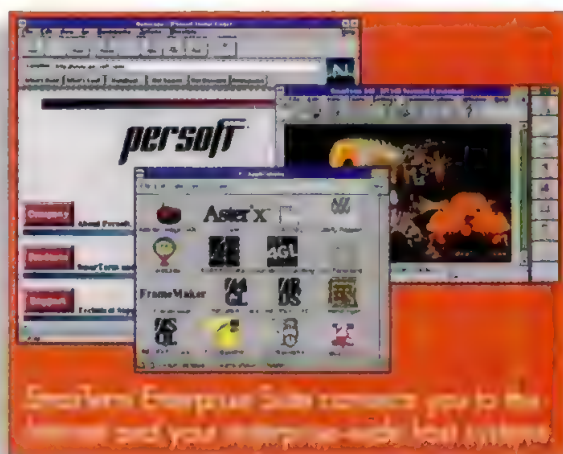
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NETWORK SCANNING DEVICES

Internet Scanner Finds Security Holes

By O. Ryan Tabibian

What with ghastly tales of hackers like Kevin Mitnick breaking into networks, and widespread direct access to the Internet in the workplace, anxiety about network security is higher than ever. As a result many organizations have installed a first line of defense—an Internet firewall. (For more details, see “Your Defensive Line,” Network Edition, March 12, 1996.)

A firewall is a great solution, but installing and configuring it properly can be tricky, possibly leaving your network vulnerable. So how do you verify that your network and system are as secure as they can be? The answer is a network scanning tool.

Internet Scanner 3.2 from Internet Security Systems is just such a product. It can probe either your entire network or specific hosts for lapses in security.

The first of the network scanners, Security Administrator Tool for Analyzing Networks (SATAN), gained notoriety in the summer of 1995. The United States Justice Department became concerned about national security issues raised by SATAN and threatened to press charges against Silicon Graphics where SATAN's coauthor, Dan Farmer, worked. But Farmer was fired, the Justice Department dropped its investigation, and development of these devices goes on.

Though Internet Scanner has maintained a lower profile than SATAN, it is much easier to use than SATAN or Qualix Group's NetProbe, another direct competitor. And Internet Scanner scans for a more ex-

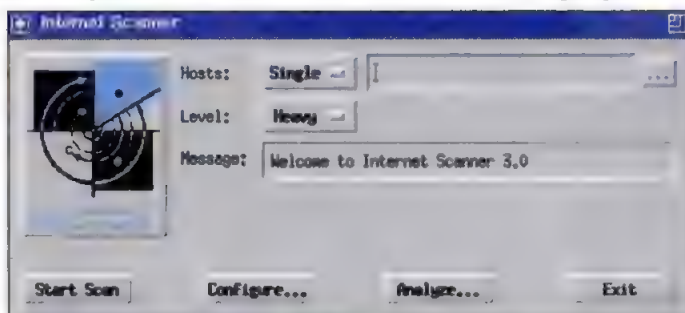
pansive list of security problems.

The scans Internet Scanner performs are based on a set of known vulnerabilities rules. The product can probe for improperly configured NFS servers that export directories mountable by everyone or for older versions of Sendmail that have possible security holes. In

**SEARCH-
ING:**
*Internet
Scanner
lets you
determine
the level
of scan
you want.*

Internet Scanner is capable of finding the security holes in Windows 95 file sharing as well.

Many security breaches are internal, so keeping your network safe from in-house users is just as important as protecting it from hackers. Conveniently, Internet Scanner can also be used as an internal au-



OPEN FIRE: You can both scan your firewall and check for spoofing with Internet Security Systems' Internet Scanner.

ditig tool, thereby allowing you to check machines on the corporate network

Scanning is time-consuming and can generate both network and host traffic. Therefore, if you are planning to run a network scan, be sure to do so when network traffic is at its lowest.

To test Internet Scanner, we installed the HP-UX version of the product on an HP Apollo Workstation running HP-UX 9.03. The product also comes in IBM AIX, SunOS, Sun Solaris versions. A Windows NT version is in the works.

The application came in a compressed-file format, which we uncompressed, and installed in a matter of minutes. Our test network had a firewall, which was running on a Sun SPARC 20. The firewall

served as our interface to the rest of the machines in the network, which included a Windows NT server as well as a Windows 95 client.

Internet Scanner includes an easy to use GUI that simplifies both scanning and creating filters. For those of you with Unix, many of these tasks can also be done using the command line if you're operating on a Unix workstation that doesn't have a graphical environment. We even found creating re-ports to be easy with this product.

All of the security holes we created on our test network, which were improperly configured NFS and FTP servers, were found

by Internet Scanner.

If you're running on Unix, don't worry. The product also has an option that allows you to scan all possible Unix ports, such as Finger, Rlogin, and Rsh.

As for pricing, Internet Security Systems offers an extensive range, depending on how many nodes you have on your network. To get an idea of what Internet Scanner would cost your organization, head to ISS's Web site.

If you're a network administrator concerned about security, consider investing in Internet Scanner. It's an essential tool for helping you better understand both external and internal network security problems.

Internet Scanner 3.2. List price: \$800 to \$20,000 (pricing available on Internet Security System's Web site). Internet Security Systems Inc., Atlanta, GA; 800-776-2362, 404-252-7270; fax, 404-252-2427; <http://iss.net>. Circle 957 on reader service card.

Additional testing for this review was provided by Michael Surkan of PC Week Labs.



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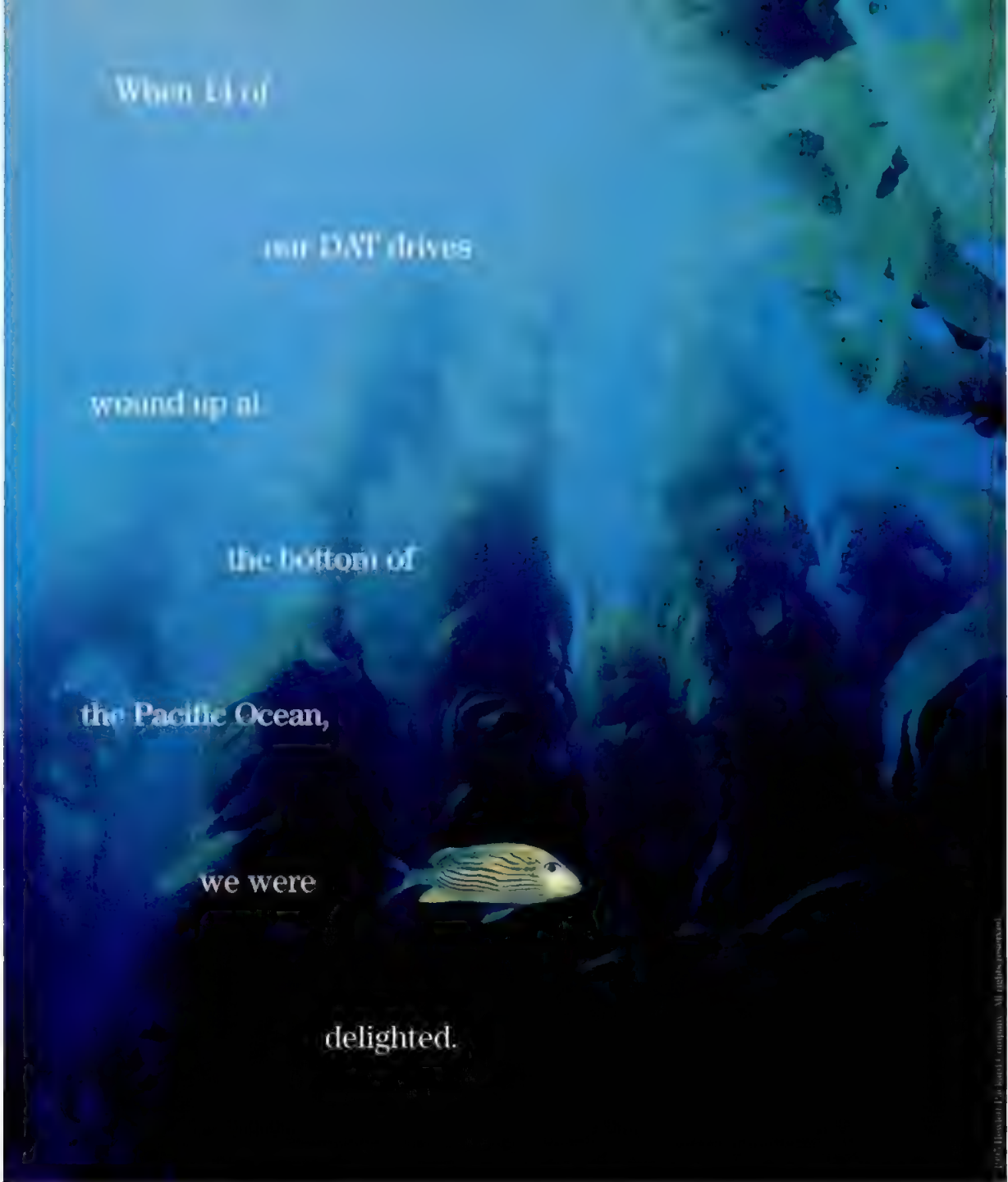
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they held a wealth of new information that may help scientists figure out just how, when, and why the earth moves.

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NETWORK EDITION

First Looks

SWITCH-MONITORING DEVICES

Madge Hits Switch-Monitoring Home Run

By Russell Iwanchuk

Imagine how hard it would be to coach a baseball team if instead of being able to view the whole field with all your players in position, you could see only one player at a time. When monitoring a switched network, you run into a similar difficulty because, unlike in shared networks, you can only see one port at a time.

If you're running a Madge or LANNET MultiNet switch, however, you're in luck. Madge Networks has just come out with a solution: SMONMaster, Version 1.0 (\$3995). SMONMaster is a network management suite that allows simultaneous high-level RMON views of Ethernet, Fast Ethernet, FDDI, and Token Ring network traffic passing through your switch. To use SMONMaster, you will also need Madge's monitoring probe, the NMA-RS (\$7995) and its MultiMan network management software (\$3995).

SMONMaster gives you a bird's-eye view of your network, providing such graphical statistics as which hosts on the network are communicating and how much, which ports see the most traffic and at what time of day, and whether any ports are reporting error packets. This just isn't possible with any other switch-monitoring software.

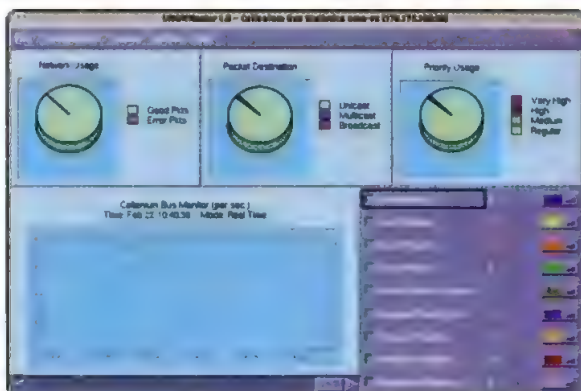
But why monitor activity on your switch? For starters, pinpointing problems, such as a slow network connection, can be difficult without an overview of switched traffic. The ability to monitor and analyze network statistics from all ports at once or to get an idea of traffic trends can be the key to optimizing limited network re-

sources and improving performance.

The unique architecture of the Madge switch is what makes SMONMaster's capabilities possible. Many switches use a fast CPU to do the switching and so any diagnostics or monitoring activity that goes on will cut into the CPU

than port-by-port monitoring of all traffic. The second advantage is that, since switching and monitoring aren't vying for the same resource, you can constantly monitor the switch without degrading performance.

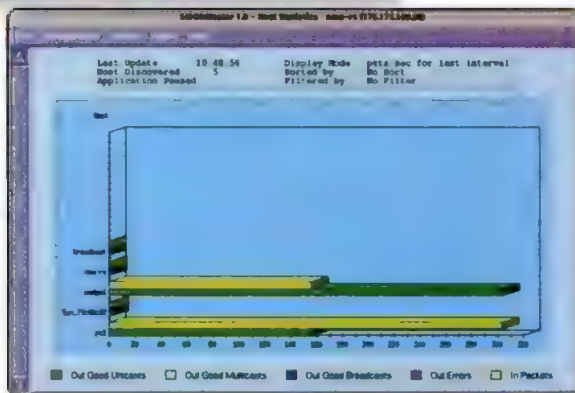
SMONMaster gets its information from the NMA-RS



STATS: To get an excellent overview of network traffic trends, use Cellenium Bus Statistics.

HOSTING:

For the kind and quantity of packets each host is transmitting, run Host Statistics.



time and cause some performance degradation. Madge uses a 1.28-gigabit-per-second Cellenium bus that handles all switch traffic, and all of the switch's modules (Ethernet, Fast Ethernet, FDDI, Token Ring, and, most recently, ATM) plug into it.

This architecture has two advantages over traditional CPU-based switching. The first is that, since all traffic must use the Cellenium bus, it must all flow through one central place in the switch. This allows for simultaneous rather

monitoring module, which is SMONMaster's tap into the Cellenium bus. SMONMaster has two versions: one running in IBM's NetView and the other under Hewlett-Packard's network management platform, OpenView (with present-day support for both the Sun and HP Unix versions and future support for the Microsoft Windows version).

We tested SMONMaster on a Sun SPARC5 with SunOS 4.1 and HP OpenView. Once SMONMaster is installed on

your workstation, you plug the workstation and the NMA-RS module into the switch, launch MultiMan and SMONMaster, and start monitoring.

SMONMaster appears as a small window with buttons that correspond to its seven tools. Cellenium Bus Statistics is the first tool you should use; it provides a good overview of traffic trends.

The other tools give you a more detailed picture. Port Statistics, Port Top N, and Extended Port Statistics all report information about ports on the switch, individually or by group. And Port Statistics presents details in the form of a graph, showing the numbers of packets per polling time for each port.

Host Matrix, Host Statistics, and Host Top N display information about the hosts at the other end of the cable. Host Statistics can show the kind and quantity of packets each host is transmitting.

Host Matrix shows a matrix of which hosts are communicating with one another, including the rate of packets sent. This information is filterable, so you can have SMONMaster display only the data that you're interested in.

If you've done your math while reading this review, you may come to the same conclusion we did: Purchasing

SMONMaster, MultiMan, and the NMA-RS module isn't exactly a cheap way to go. But your \$16,000 will buy you unparalleled switch-monitoring capabilities that other vendors would do well to consider implementing.

SMONMaster, Version 1.0. List price: \$3,995; MultiMan, \$3,995; NMA-RS, \$7,995. Madge Networks Inc., San Jose, CA; 800-876-2343, 408-955-0700; fax, 408-955-0970; <http://www.madgenet.com>. Circle 956 on reader service card.

Headline:

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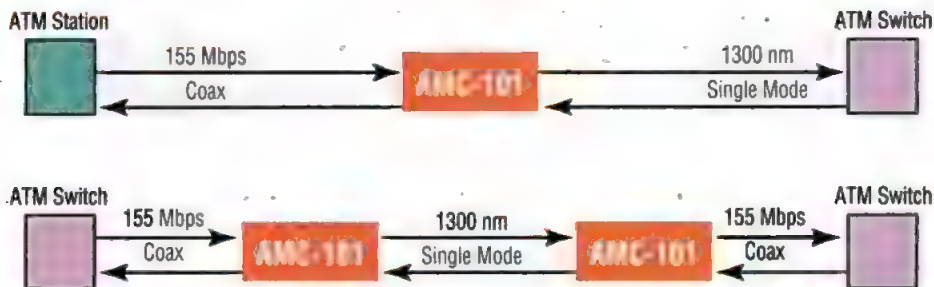


Product name: AMC-101

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New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Eryn Brown

Walk-Up Networking from HP

A PORTABLE MIGHT BE IN YOUR FUTURE—IN THE OFFICE and out. Hewlett-Packard's new **NetBeamIR Infrared Access Point** (\$289) lets you hook into your Ethernet LAN without cables. All you need now is a portable computer with an IRDA-compatible port.



HOW DOES IT WORK? HP's **NetBeamIR** gets you connected without the wires.

The **NetBeamIR** is faster than most other wireless technologies; it can negotiate 115 Kbps, 1 Mbps, or even 4 Mbps. It's easy to install, since all you have to do is plug in a power cord and a LAN cable. Designed for use with Windows 95, it can work with Microsoft LAN Manager, Microsoft Windows NT, NetWare, and OS/2 LAN Server networks. Your notebook's IR transmitter must be within 3 feet of the **NetBeamIR** to maintain a network connection.

The unit weighs a little over a pound and has LEDs to indicate power and IR link status. It can work with both RJ-45 and BNC connectors. **Hewlett-Packard Co.**, Roseville, CA; 800-533-1333; <http://www.hp.com>. **Circle 963 on reader service card.**

WRQ Ships New Suites

NOW YOU CAN EXPAND ON your connectivity options as never before. WRQ has announced two new suites. The **Reflection Suite for the Enterprise** (\$449) services large, heterogeneous sites that need to connect with SNA and open TCP/IP. The company has also released the updated **Reflection for TCP, Version 5.6** (\$399). **WRQ**, Seattle, WA; 800-872-2829; <http://www.wrq.com>. **Circle 965 on reader service card.**



THE MANY FACES OF REMOTE ACCESS from Penril Datability Networks.

Penril's Access Beyond

IT'S NOT JUST ABOUT MODEMS: Penril Datability Networks is branching out. The **Access Beyond** product family (configurations start at \$1,695 and up) provides a modular remote access solution designed to meet all of your needs.

Available with V.34 modems, ISDN PRI and BRI modules,

and a variety of LAN and WAN interfaces, the **Access Beyond** units come in four different chassis configurations, which are scaled to your needs.

The supplied software provides IP, IPX, and AppleTalk routing, SNMP management, and a Windows-based management and configuration utility. Each unit also comes with security features including centralized password protection, CHAP and PAP authentication, and SecureID support. **Penril Datability Networks**, Gaithersburg, MD; 800-473-6745; <http://penril.com>. **Circle 966 on reader service card.**

HOT PROSPECT

Motorola's 925 System Grows With Remote-Access Needs

Getting connected isn't a simple matter these days; most businesses rely on a number of technologies. Motorola has announced new products for the **925 System**, enabling a wider variety of remote-access solutions.

The **925 LanRover/8E (LR8E)** (\$4,250 and up) was developed jointly by Motorola and Shiva. It provides remote dial-in, dial-out, and LAN-to-LAN asynchronous communications. Equipped with a multislotted rear panel that plugs into the 925, the 925 LR8E delivers a 10Base-T connection, a configuration port, and eight asynchronous data ports, which connect to 925 device cards such as the **BitSURFR Central**. The 925 LR8E can perform bridge and router functions, and it has 11 status LEDs.

Also new to the 925 is a v.120 software upgrade (\$150) that lets the 925 Dual Hybrid Modem (\$29,995 for 24 ports and T1 access) function as an ISDN device, the **BitSURFR Central** (\$775 and up), a shelf-mount ISDN adapter, which provides two 64-Kbps B-channels; and the **925 NMS** (\$2,995 and up), which works with HP OpenView to let you monitor and configure the 925 System.

Motorola Information Systems, Huntsville, AL; 800-221-4380; <http://www.mot.com>. **Circle 958 on reader service card.**



Windows 95 SAPS Client

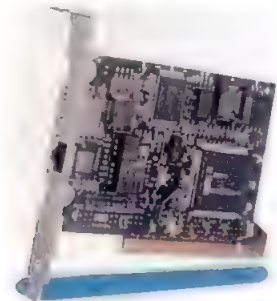
NOW THIS 32-BIT APPLICATION will look like one. TSP Companies is shipping a Windows 95 client (5 users, \$149) for its **SpartaCom Asynchronous Port Sharing Software (SAPS)**.

SAPS is a Windows NT communications server package that enables two-way 32-bit modem sharing. **TSP Companies**, Atlanta, GA; 770-457-0703; fax, 770-457-5225; <http://www.tspco.com>. **Circle 967 on reader service card.**

New & Improved

Allied Telesyn: Movin' On Up

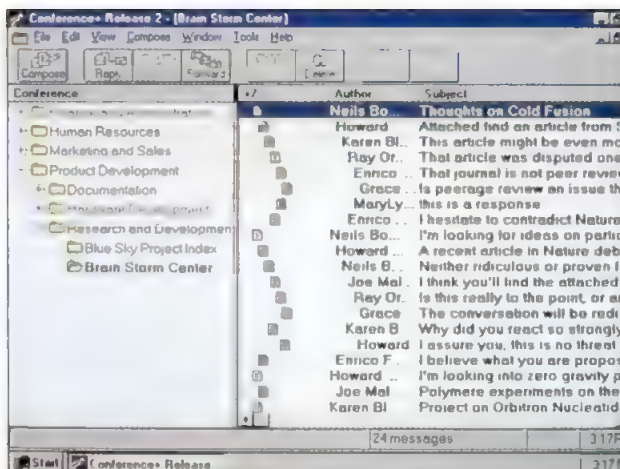
MIGRATING TO FAST ETHERNET continues to grow easier with Allied Telesyn International's latest 10/100 PCI adapter, the **AT-2560TX** (\$169;



THE AT-2560TX provides Fast Ethernet connections.

volume discounts available).

The AT-2560TX features auto-negotiation and auto-switching; its drivers automatically detect and respond to LAN speed. This means that you won't need to reset jumpers or load new drivers when you move up to Fast Ethernet. The adapter also offers full-duplex operation at 10 and 100 Mbps. **Allied Telesyn International**, Sunnyvale, CA; 800-424-4282; fax, 408-763-0100; <http://www.alliedtelesyn.com>. Circle 962 on reader service card.



DISCUSS AMONGST YOURSELVES: Conference+ adds customized views.

Mesa Beefs Up Conference+

MICROSOFT MAIL USERS TAKE HEART: THE MESA GROUP has updated its groupware add-on. **Conference+ Release 2.0** (25 to \$75 per user) appears as part of the MS Mail interface and provides group discussions, document sharing, and other groupware functions.

The release adds new functionality to the package. First, users connecting through the Microsoft Mail client will now be able to customize conference views and forms, to create up to 10 folder and 40 response levels, and to take advantage of new drag-and-drop capabilities. Conference 2.0 also features integration for Microsoft Exchange users, letting them coexist in discussion groups with Microsoft Mail and Lotus Notes users.

Mesa has also simplified the conference administration tools in the package. The Conference+ Administrator is Windows-based and uses the new Microsoft Mail folder interface. Managers can control remote users from a central location and can activate new remote users through e-mail.

The Mesa Group, Newton, MA; 617-964-7400; fax, 617-964-4240; info@mesa.com. Circle 961 on reader service card.

Help for Your Help Desk

FOR THOSE PLANNING TO put together a help-desk site—or embellish an existing operation—Astea International's **PowerHelp 2.2** (\$2,500 per seat) should prove a useful tool.

The main enhancement to the package is the addition of a Web-based interface. Combined with the Fulcrum hypertext search engine/gateway, the Web interface gives end users 24-hour access to the information they need.

The Web front end accesses your server through a three-tier client/server structure, which blends well into existing installations. It also shields your server from end users.

Astea International Inc., Chalfont, PA; 617-275-5440; fax, 617-275-1910; <http://www.astea.com>. Circle 959 on reader service card.



HELP YOURSELF to tech support.

BRIEFS

Hardware

If you're in the market for some serious bandwidth, look out for four new Fast Ethernet modules (\$1,495 and up) for 3Com's **LAN-plex** switches. All of the new modules route IP, IPX, and AppleTalk. 800-638-3266 Emulex has announced the imminent availability of its **LightPulse Fibre Hub** (\$2,995 and up). The hub aids the management of Fibre Channel arbitrated loop networks. 800-854-7112 Remote users dialing into or out of Ethernet networks can now take advantage of Focus Enhance-

ments' **LAN Ranger** (\$1,149), a new three-port PPP remote-access server. 617-938-8088 Microsoft Windows 95 users can reap the benefits of plug-and-play installation—at a low cost—with Kingston Technology's new **EtherX PnP** adapters (\$79 and up), which are compliant with the current Windows 95 Plug and Play standard. 800-435-2620.

Software

If your server has crashed, Alexander LAN's **Alexander Server Protection Kit (SPK)** for **NetWare 3.11-4.10 Release 2.00** (\$698) can

automate your diagnostics process, your restart, and your remote e-mail support setup. 603-880-8800 The **NetXRay PRO?** (\$4,995 and up) protocol analyzers have debuted from Cinco Networks. Combining the NetXRay? software with an adapter and drivers, the first release from the new family analyzes FDDI LANs. Other versions will follow. 800-671-9272 Administrators working with NetView for Windows NT may want to investigate Stony Brook Software's **TroubleTrax** (\$1,495 per seat), a new trouble-ticketing application. 516-567-6060.



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just
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an **installation**

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without
ever leaving
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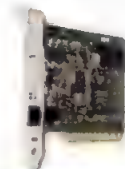
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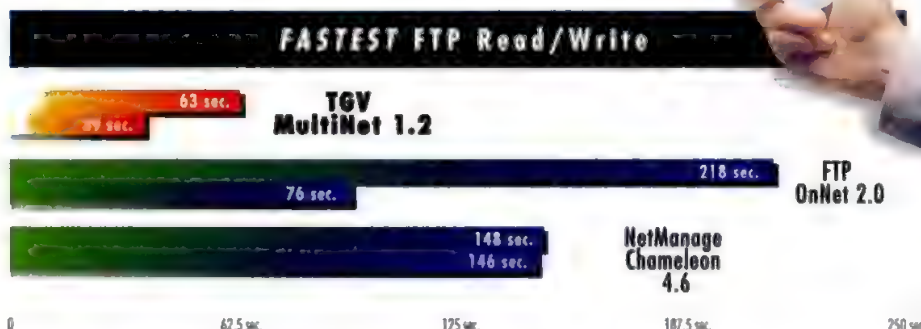


THE FASTEST TCP/IP APPLICATIONS FOR WINDOWS. **GUARANTEED.**

FASTEST FTP FILE TRANSFER

MultiNet's FTP client is between 2X and 3X faster than either OnNet or Chameleon when transferring files over a TCP/IP network.

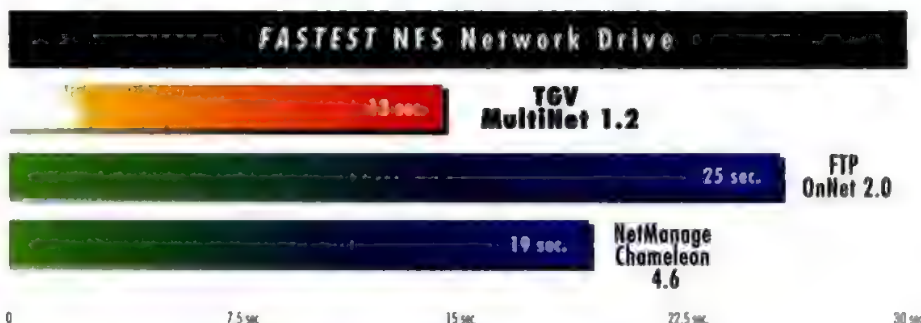
Results shown based on transferring a 20MB file between a Windows PC and a Sun SPARC server.



FASTEST APPLICATIONS LAUNCHING

MultiNet's NFS client is nearly 2X faster than OnNet and 50% faster than Chameleon when launching applications from an NFS server.

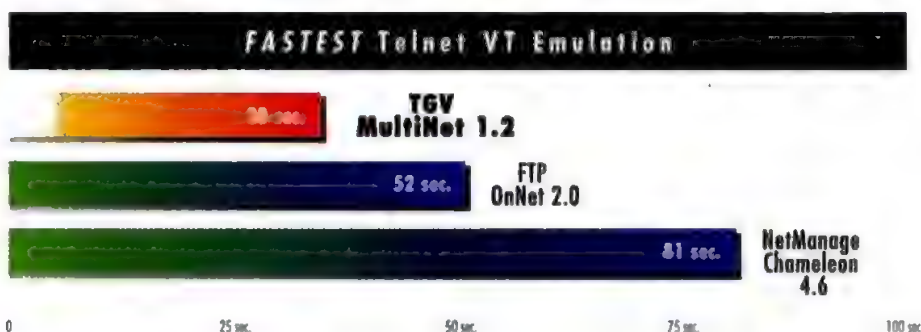
Results shown based on launching Microsoft PowerPoint 4.0 and opening a 1MB presentation from an NFS network drive on a Sun SPARC server.



FASTEST HOST APPLICATIONS DISPLAY

MultiNet's Telnet VT emulator refreshes multiple windows over 50% faster than OnNet and more than 2X faster than Chameleon. Each MultiNet window always displays the correct VT screen behavior.

Results shown based on running a freely available terminal test in three windows simultaneously on a Windows PC from a Sun SPARC server.



CATCH US IF YOU CAN. These independent benchmark tests show OnNet and Chameleon couldn't! TGV's MultiNet® for Windows dramatically outperformed both competitors in these real-world network activities. Here's the TGV challenge: run these tests for yourself with MultiNet and see how a Windows TCP/IP product designed for corporate internetworking should really run. We're certain you'll find that MultiNet dramatically improves your corporate network and Internet performance. To take the TGV challenge, download a free trial copy of MultiNet for Windows from our Website <http://www.tgv.com> or call 1-800-TGV-3440.

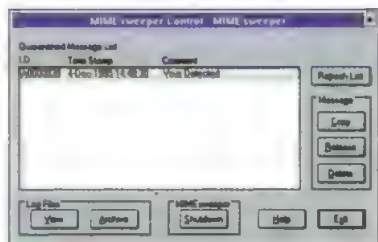


All testing performed by LaPlaya Consulting, Inc. Testbed consists of a DX2-66 Intel 486 PC running Windows for Workgroups 3.11 with 16MB memory, SCSI disk controller, 3Com 3C509 Ethernet card linked with 10base2 cabling to a Sun Microsystems SPARCstation 10 running Solaris 2.5 with 32MB memory. Test results are the averages derived from multiple iterations. Each vendor's TCP/IP product was installed using the default configuration. ©1996 TGV Software, Inc. Tel: 408-457-5200 Fax: 408-457-5205. Email: sales@tgv.com Web: <http://www.tgv.com> MultiNet and the TGV logo are registered trademarks or trademarks of TGV Software, Inc. in the United States and certain foreign countries. All other trademarks are the property of their respective owners. Developer tested only. Novell makes no warranty with respect to this product. 060/1

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The program is transparent to the end user. It can decode a variety of file types, including DLL, .EXE, MIME, UUEncode, and .ZIP.

Integralis Inc., Kirkland, WA; 800-982-6109; <http://www.integralis.com>. Circle 960 on reader service card.

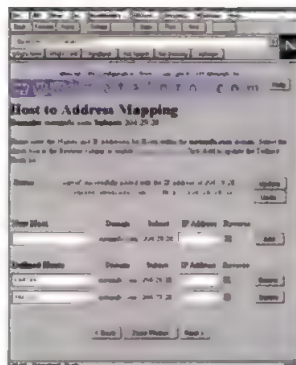
MetaInfo's Apps Debut

METAINFO IS INTRODUCING two new Microsoft Windows NT products that should ease the Windows NT management process.

DNS 2.0 for Windows NT (\$400) is an update to MetaInfo's earlier Domain Name Service (DNS) server. The new package is equipped with an HTML-based interface, which makes it the first GUI-based DNS package for Windows NT.

MetaInfo's second new product, **Sendmail with POP3** (\$495), is a direct port from the SMTP e-mail server Unix Sendmail. **MetaInfo Inc.**, Seattle, WA; 206-

521-2600; <http://www.metainfo.com>. Circle 964 on reader service card.



AN HTML interface lets you abandon DNS commands.

MULTIPLE ACCESS By Steve Buehler

Server, Tune Thyself



I love using technology to solve problems. I really love using other technology to leverage the technology I've already got. Along this line, I've recently seen some network tuning products that show what can be done when one program watches another program at work and suggests changes

to the configuration to improve throughput.

At COMnet in late January, I came across SysLoad, from Loan System (011-33-1-43-99-28-28). This French-based company has been making network performance-management software for ten years, but has begun only recently to establish a presence in U.S. markets. SysLoad for NetWare (\$995 for 25 users) does real-time monitoring of a NetWare 3.x or 4.x network, including overall system load, user activities, and specific loads on storage and printing resources. SysLoad also maintains historical information, so you can document recurring problems—for example, high print loads at end-of-month reporting time. This is a great tool for justifying additional resources to your management by showing the peak and sustained demands placed on the network resources over time. It's also good for showing users how they can contribute to network solutions by time-shifting workloads.

If you want to increase your system performance without adding RAM or hard disk space, you can find NetWare tuning

programs that watch the system activity and then suggest changes to the NetWare SET commands. Today, the best of these is NetTune Pro 2.2 (\$895), from HawkNet (619-929-9966). NetTune Pro looks at server parameters, system resource utilization, and LAN traffic patterns and either suggests changes to SET or makes those changes for you. By monitoring usage over extended periods, this tool can suggest the best settings for overall use or for the peak loads you may experience at crunch times.

I've worked with enough OSs to know that none of them needs more tuning help than Unix. The flexibility of systems such as SCO's Unix or OpenServer is great, but finding your way through the kernel tuning parameters is a nightmare. TuneUp 3.1 (\$495), from Olympus Software (800-792-1273), represents the state of the art for using a system to monitor itself.

Built for SCO systems, TuneUp can (if you let it) automatically go through the cycle of adjusting tuning parameters, relinking the kernel, and watching to see the improvement. This continuing analysis and correction is a smart way to match your computing resources to the demand without jumping into costly increments of more CPU power or memory with unknown results.

One thing senior management loves is when you do a better job with the resources you have. Tools like these are great for getting the most from your current servers, usually with little work on the part of network administrators. One short-range benefit is that they also document the demands placed upon your network: It's hard for the bean counters to argue with reports that show how users are clogging up resources. A long-range benefit is that as self-monitoring technology matures, managing the ever-increasing complexity of both the technical and business sides of your network could become more automatic and perhaps less worrisome.





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I need to post this!

Why is this machine so slow?

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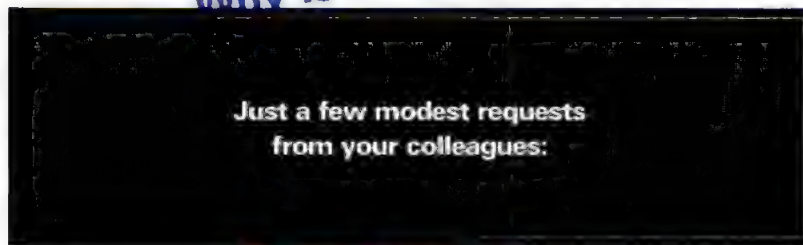
I'm lost. Help me.

What do you mean I can't access that?

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I want to post this file on the Net.

Why is this machine so slow?



Can we view images?

Is it forward slash or backslash?

Why is computer training so expensive?

Why do I have to learn all these crazy voodoo commands?

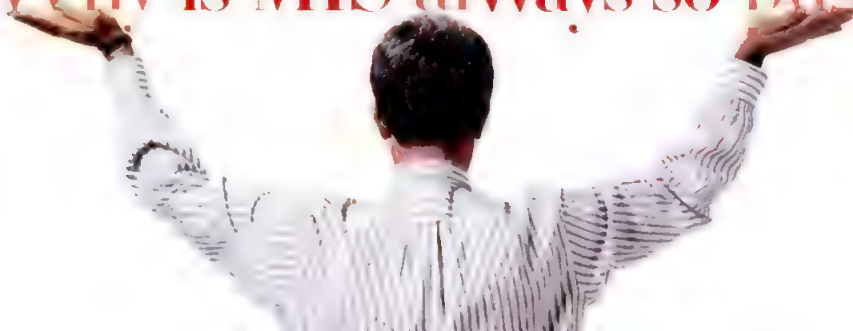
Why is the net down?

This is so

I left you a voicemail...

Text-only e-mail is so 80s.

Why is MIS always so busy?



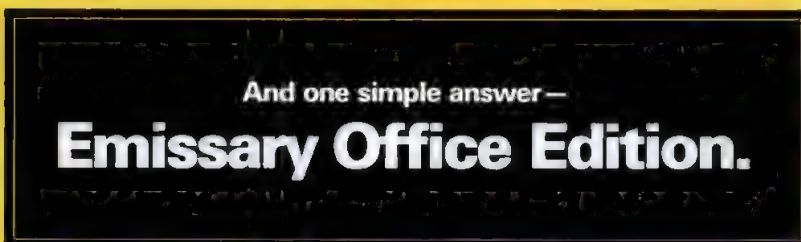


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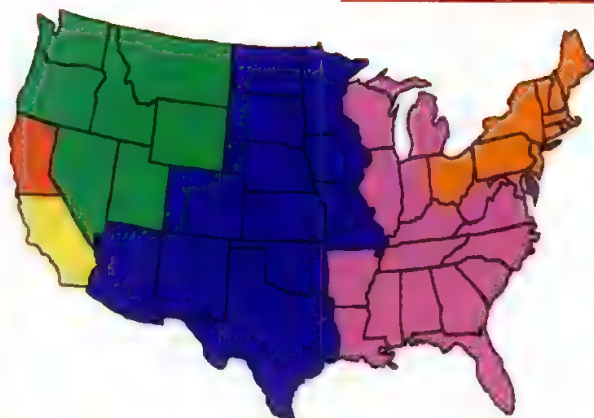
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"Instant Internet's simplicity and security make it a sure choice for Internet access in NetWare LANs"

PC Magazine 5/9/95

"Within 30 minutes of taking Instant Internet out of the shipping box, we had happy PC users surfing the Internet"

Byte 7/5

"the perfect out-of-the-box network Internet connection"

Computer Reseller News 5/22/95

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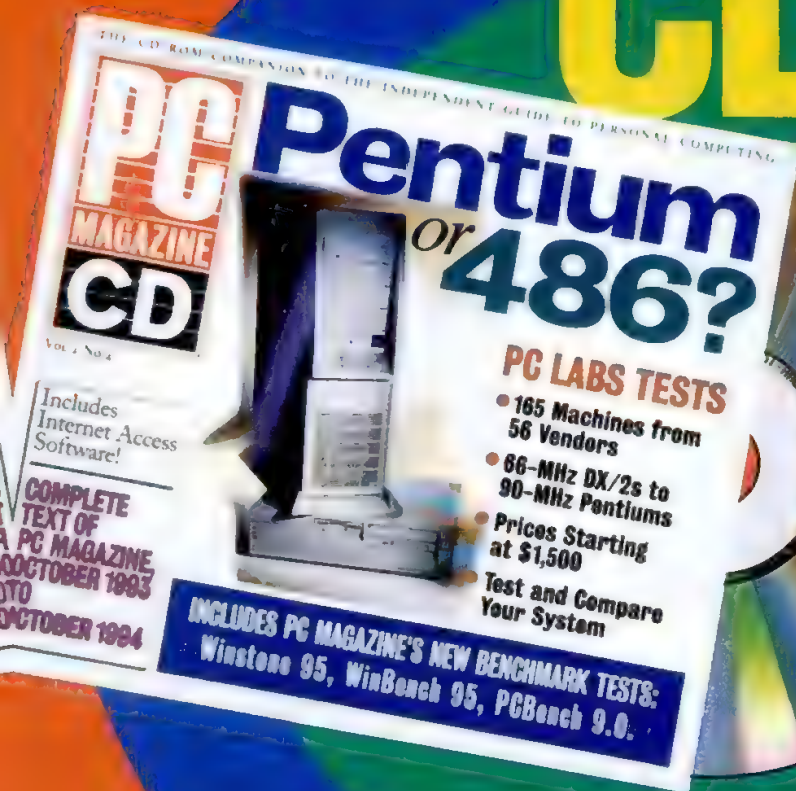


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INSTRUMENTS**

DISCUSSION & DOCUMENT DATABASE SERVER

Web browsers can access your discussion and document databases. Attachmate, Digital, Lotus, Microsoft, and other companies are developing the automated links between Web servers and existing collaborative and document database products.

DATABASE SERVER

The Web browser can pull information from corporate databases. Most Web servers conform to the Common Gateway Interface (CGI) specification, which lets programmers write applications in Perl or C++ that make SQL calls in response to browser requests.

WEB SERVER

HTTP
REQUEST

HTML
PAGE

A computer equipped with a Web browser sends an HTTP request for service across the LAN/WAN links to the corporate Web server.

For most HTTP requests the Web server sends an HTML-formatted page back to the requesting Web browser.

The user gains access to a variety of company resources via a single front end—the Web browser.

C O R P O R A T E I N T R A N E T S

The Web Within

Corporations are using internal Web servers to give employees easy access to corporate information. But how do intranets measure up to legacy groupware applications?

By Leon Erlanger

FILE SERVER

In some cases the Web server pulls graphics, text, or other files from the file server and broadcasts them back to the requesting Web browser.

No doubt you've surfed the World Wide Web to get information from all over the planet. But what about the mysterious world of information inside your own organization? You know what you're looking for is there, but it is widely dispersed and stored in a number of different file formats, printouts, and e-mail messages. And there is probably no organized way to access it.

A number of companies are setting up internal corporate Web sites, or *intranets*, to give employees easy access to mountains of corporate information. In a corporate intranet, the familiar Web browser becomes something close to a universal client: It can access a variety of back-end files and databases via the corporate Web

server. And a number of home pages serve as hypertext links to all kinds of documents and data.

The corporate intranet is also an excellent platform for groupware applications. Vendors are working on products that will let your employees use your internal Web for group discussions and other collaborative tasks.

In this three-part feature we attempt to answer a number of questions: What is a corporate intranet? What types of functions can you use it for? How does it compare with legacy groupware platforms?

We also test and review a number of collaborative and document database products that you can link to your corporate Web server. And we provide a primer on how to set up your own Web within.

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THE INTRANET PLATFORM

A Universal Client?

In the past few years, hundreds of entrepreneurs have produced a tidal wave of programs, procedures, and tools for the Internet. The powerful technologies that have resulted, including Web browsers, Web servers, the hypertext markup language (HTML), and the hypertext transfer protocol (HTTP), have made it easy for diverse Internet sites to share all kinds of information.

But the use of Internet technologies does not have to be limited to a worldwide information platform. Increasingly organizations are realizing that the same technologies that can stand up to the beating of the Internet can also be used to create a powerful corporate information and collaboration system, popularly referred to as an *intranet*. In fact, according to Zona Research, a market-research firm located in Redwood City, California, revenues in 1998 from the sale of Web servers for intranets will be four times those for the Internet. Software developers will certainly find more revenue in programs for intranets than for the worldwide Internet.

INTRODUCING THE INTRANET

The intranets springing up today generally consist of internal corporate Web servers made available to employees across the LAN or through private dial-up access. Through links to corporate databases, file servers, and document repositories, Web servers bring diverse kinds of information to employees via a single front end, the familiar Web browser. Employees use their Web browsers to access a series of corporate Web page with links to corporate documents and data written in HTML. Increasingly products are also appearing to give intranets group discussion and other groupware features.

Business writers and market analysts have long been singing the praises of companies such as Domino's Pizza, Federal Express, and Nordic Track, which flatten and lubricate their corporate structures by



The corporate intranet has become an entire application platform with a single client: the Web browser.

By Frank J. Derfler, Jr.

Corporate Intranet Strategies and You

By Frank J. Derfler, Jr.

The makers of groupware platforms and operating systems were busy focusing on one another with new product introductions when the Internet/intranet gang, led by Netscape and Sun Microsystems, burst in and started changing the rules. Suddenly we have a powerful new information platform based on World Wide Web technologies that is operating system-independent and owned by no one. And it's catching on faster than anyone expected, with new applications appearing almost daily.

The big boys may have been caught unaware at first, but they have changed their strategies to accommodate the Internet platform. Each of them wants to make sure that it retains or improves its market position as a result. Meanwhile, we have new players making important contributions and even some old players that we haven't heard much out of for a while.

What will the Internet/intranet look like after another year of head-butting by these corporate giants? Keeping in mind that 12 months is several years of

Internet life, we can predict links to the Web from most applications and operating systems. You'll see Web browsers embedded in your favorite applications, and ways of accessing and in some cases manipulating your application files from your favorite Web browser. Popping in and out of the Internet or the corporate intranet to pick up a piece of information will become as common as working with your word processor. And your company's Oracle or Sybase database will take on new life through the ease of use a Web-browser client provides.

Templates and authoring tools will enhance the eye-appeal of the average Internet and intranet site. Java, OLE, and other technologies promise new interactive applications.

Is a dedicated Internet terminal in your future? We think probably not. If the Internet terminal or Internet PC is going to be any kind of success, it will only be because companies develop a different sales model. The cellular telephone model applies: Contract for a year of service and we'll sell you the terminal for \$500 (or any other price

the competition demands).

The clashes between Sun on one side and Microsoft and Intel on the other, and between Netscape and Microsoft, will be the major sounds heard in the Internet/intranet markets. Sun equipment and software powers the majority of World Wide Web and ftp sites, and Netscape has perhaps two thirds of the browser market. Microsoft wants to make both Sun and Netscape irrelevant.

Will Sun and Netscape win or lose their battles with Microsoft? Probably a little of both. Browsers like Netscape Navigator and hardware like the Sun SPARCserver will probably stay at the high end, but both companies will cede the middle and low ends of the market to Microsoft. This means that Microsoft's browser and Web server will be good enough for a majority of the installations, including much of the intranet market. But multimedia sites will benefit from the proprietary features Netscape's products provide.

Here we outline the corporate strategies of some of the big players and their implications.

	Strategy in a Nutshell	Method	Implications
Netscape Communications Corp.	Own the browser and Web-server Markets. Grow the browser as a new corporate desktop environment.	Give away beta software. Stay on the technical leading edge. Provide APIs for developers of Internet applications. Integrate Collabra Share Partner with everyone.	Netscape's product line may end up being a principal platform for Internet-based applications. But it can expect very tough competition from Microsoft.
Microsoft Corp.	Keep people using Microsoft applications and operating systems. Make Windows NT the Web-server platform of choice.	Give away free Web browsers. Provide Internet Information Server free with Windows NT Server. Establish links to all Microsoft applications from the Web.	Microsoft will own a big piece of the Web-server market. You'll be using your Microsoft software together with your intranet for years to come.
Lotus Development Corp.	Make Notes the premier Internet document-publishing and collaboration platform for large corporate users.	Provide Notes Navigator and InterNotes Web Publisher free with Lotus Notes 4.0. Lower the price of Notes while building on its advantages over intranets.	Companies already using Notes will probably stay with it. Companies in need of a comprehensive groupware platform will take a close look.
Sun Microsystems Inc.	Prevent loss of server market share to Intel and Microsoft. Find new markets through Java.	Market Java heavily. Partner with everyone.	Java will most likely spur a new category of interactive applications. Sun-based Web servers will be important at the high end of the market.
Oracle Corp.	Drive the Internet/intranet to sell more client/server platforms.	Develop dedicated Internet workstations. Educate developers on Web-to-SQL links.	You will undoubtedly be accessing your corporate database via your Web browser.
Novell Inc.	Still here.	Buy the NetWare Web Server NLM. Integrate browsers into GroupWise.	The future for Novell as a player in corporate intranets is uncertain.

linking employees with existing groupware packages such as Lotus Notes and Novell's GroupWise. The popular groupware products offer collaboration through threaded discussions and information distribution through document databases. But groupware systems can be expensive and cumbersome to install and manage. During installation, you struggle to accommodate the different hardware and operating system combinations of your numerous clients and the various network protocols in your organization. Then you have to develop a cadre of trained maintenance and support people who can handle the arcane commands and tricks of the proprietary groupware package.

By contrast, intranets are relatively inexpensive to install and administer. Web browsers are available free or almost free from numerous vendors, including Microsoft, Netscape, and Spry. Inexpensive or free Web-server software can also be found at numerous Web sites and even come packaged with operating systems such as Windows NT Server (see "Setting Up Shop" in this story). And the corporate intranet provides an information layer that is essentially independent of the operating system—anyone running on just about any network or desktop operating system can access information on the corporate Web server with the same browser they use to surf the World Wide Web.

Since employees use their familiar browsing tools, you avoid the training and support burdens that come with proprietary groupware client programs. You can instead focus your in-house software development work on important business functions. Employees stay with one comfortable application for a variety of functions ranging from searching databases to entering sales reports to sending e-mail.

The one hidden expense of setting up a corporate intranet is that you must run

Intranet Thumbs-Up, Thumbs-Down

While intranets have certain obvious advantages, they also have weaknesses. Deciding to adopt an intranet should not be an all-or-nothing



proposition. You can use Web tools to complement your existing information infrastructure.



An intranet is an excellent **platform for publishing** information internally.

The **ubiquitous Web browser** is available for virtually every client OS—unlike proprietary groupware clients, which may not be available for some platforms.

Web servers **don't need as much hardware** processing power and hard disk space as such classic groupware packages as Lotus Notes.

The market for Web server software is competitive—**not a single-vendor solution**. But the products interoperate well.

Web technology is scalable and can be used across wide area networks.

New authoring tools in desktop application suites make it **easy for novices to create HTML** pages for Web servers.

Collaborative applications for intranets are not as powerful as those offered by traditional groupware.

You have to set up and maintain **separate applications** such as e-mail and Web servers, instead of using one unified system as you would with a groupware package.

Limited tools exist for linking a Web server to databases or other back-end applications.

Intranets require a **TCP/IP network**, unlike other groupware solutions that will work with your existing LAN transmission protocols.

Intranets include **no built-in replication** for remote users, while packages such as Lotus Notes do.

HTML is **not powerful enough** to develop client/server applications. Programming standards for the Web, such as Java, are just emerging.

TCP/IP (transmission control protocol/Internet protocol), the protocols that define how information is passed around the Internet, on your network. If your organization runs on TCP/IP now, then you've paid the price for more memory and new software in desktop PCs and more capable routers throughout the network. Your network administrators have learned the tricks and traumas of setting up IP LAN software and assigning network addresses.

If you don't want to adopt TCP/IP fully, then you can use TCP/IP gateways from companies such as Firefox and Performance Technologies. These devices

translate between TCP/IP and Novell's IPX (Internet packet exchange) or Net-BIOS and reduce many of the problems associated with bringing TCP/IP onto the corporate LAN.

If your intranet system is successful, you might incur a secondary cost in reconfiguring your LAN to accommodate a busy Web server. You might create a subnet with the Web server, document-database server, and remote-access server tied together on the same network segment. This strategy keeps intranet traffic off the cables carrying orders, inventory, and other bread-and-butter data.

The person in charge of the intranet system needs practically the same skills as the administrator of the small LAN, plus some rudimentary graphic-arts skills and the ability to handle both HTML and TCP/IP. The PC Tech/Power Programming tutorial in our issue of December 5, 1995, provides an excellent overview of

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The Intranet Platform

the process involved in creating HTML pages. As the capabilities of an intranet grow, skills such as database administration, advanced graphics arts, and telecommunications management quickly come into play. Employees like learning how to design and maintain Web systems because, unlike many groupware systems, the skills are transferable and portable.

WHITHER GROUPWARE?

Do intranet technologies have the potential to displace well-known groupware systems such as Lotus Notes and Novell GroupWise? Given the flood of entrepreneurs working on new products, they do. But the issue is not necessarily groupware

versus the intranet. Traditional groupware packages, notably Lotus Notes, are providing sophisticated intranet links that can bring their unique advantages to intranet collaboration.

One great advantage of traditional groupware products, at least today, is their ability to do *replication*. A remote Notes user can dial in to a Notes server, grab mail and documents, run for an airplane, and read it all at 35,000 feet. She can even make changes to documents and compose e-mail messages in the air, and, depending on her access rights, the information will be updated on the Notes server the next time she connects. At the same time, Notes servers at several locations

can continually update each other to make sure that the databases on each are the same. Intranets do not yet offer this sophisticated technology.

Also keep in mind that to get all the capabilities of a powerful platform such as Lotus Notes for your corporate intranet will probably require stringing together numerous products from many different vendors. You may find that this ends up being as expensive as or even more expensive than using one comprehensive groupware platform and that making all these products work together is more trouble than you bargained for. Indeed, many of the Web-linked document-databases and discussion products

GLOSSARY

An Intranet Glossary

CGI (Common Gateway Interface) A standard that allows Web servers to run external applications such as search engines.

Collaboration software A network-based application that lets participants share information.

Document database An organized collection of related documents.

Firewall Hardware or software that restricts traffic to a private network from an unsecured network.

FTP (File Transfer Protocol) An Internet protocol that allows a user on one host to transfer files to and from another host over a network.

Groupware A network-based application that lets users collaborate.

Home page The first page of a Web site or of a logical group of HTML documents.

HTML (HyperText Markup Language) The language with which World Wide Web documents are formatted. It defines fonts, graphics, hypertext links, and other details. HTML is an implementation of SGML.

HTTP (HyperText Transfer Protocol) The protocol that negotiates document delivery to a Web browser from a Web server.

Hypertext A way of presenting information in which there are links from one document to another. In a

Web document, the link is a URL pointing to another Web page or other resource.

Intranet A private network that uses Internet software and standards.

ISAPI (Internet Server API) A Web-server programming interface for back-end applications developed by Microsoft and Process Software Corp.

Java An object-oriented language, developed by Sun Microsystems, for writing distributed Web applications.

NNTP (Network News Transfer Protocol) A protocol for posting and retrieving news articles on Usenet newsgroups.

NSAPI (Netscape Server API) A programming specification for Netscape's Web servers to access back-end applications.

ODBC (Open Database Connectivity) An interface developed by Microsoft to let clients access multiple database engines.

Perl An interpreted scripting language, typically used in writing CGI scripts.

Replication The process of synchronizing data stored on two or more computers.

SGML (Standard Generalized Markup Language) A standard for defining and managing the structure and format of electronic documents.

S-HTTP (Secure HTTP) An extension of HTTP for authentication and data encryption between a Web server and a Web browser.

SQL (structured query language) A standard language for requesting information from a relational database.

SSL (secure sockets layer) A transport-level technology for authentication and data encryption between a Web server and a Web browser.

TCP/IP (Transmission Control Protocol/Internet Protocol) The collection of transport and application protocols used to communicate on the Internet and other networks.

URL (Uniform Resource Locator) A standardized character string that identifies the location of an Internet document.

Web browser Client software that requests and displays HTML documents and other Internet or intranet resources.

Web server A server that stores and retrieves HTML documents and other Internet or intranet resources using HTTP. Also called an *HTTP server*.

Workflow A set of formal rules for a specific process (such as billing) that are defined to improve efficiency.

World Wide Web The Internet's worldwide, HTML-based, hypertext-linked information system.

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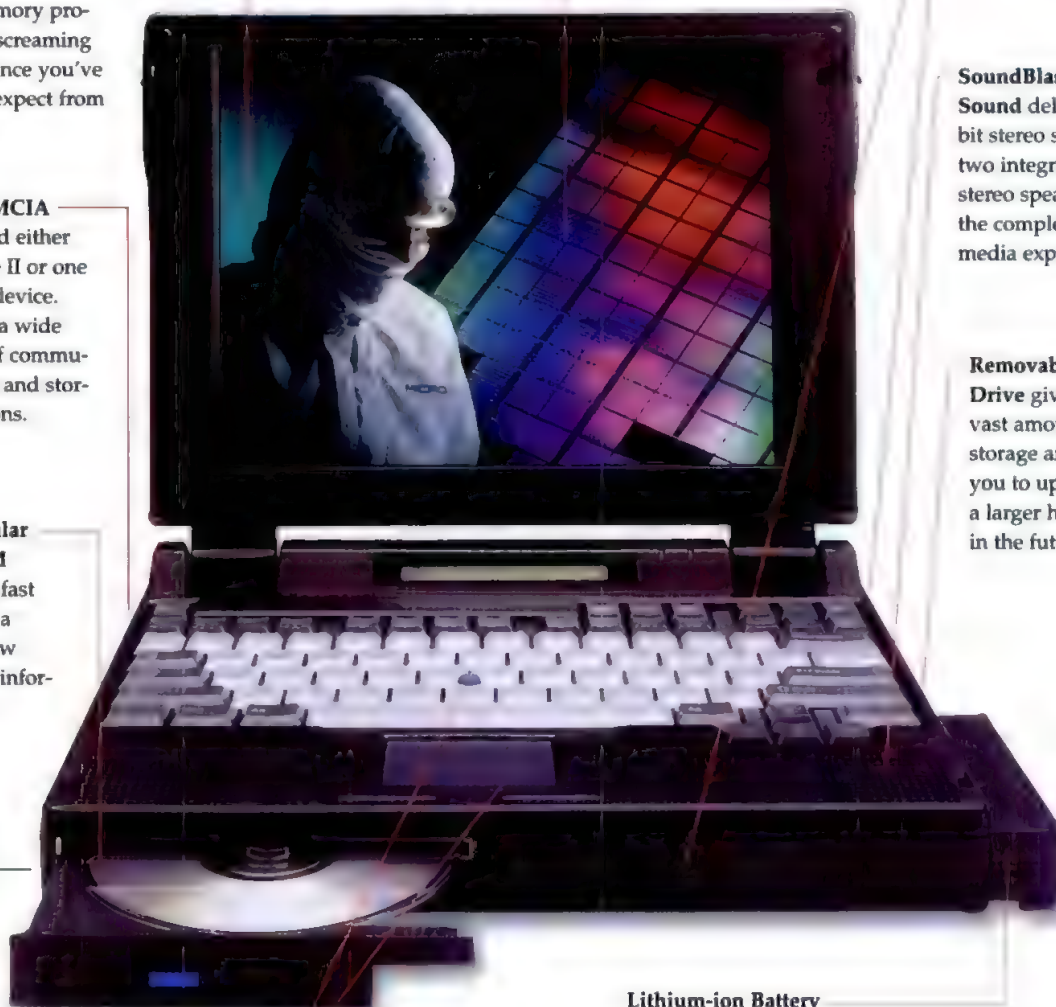
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The Intranet Platform

we tested were priced at several thousand dollars and proved difficult to install and configure.

If you're in a large organization looking for a powerful platform to do a variety of functions from group discussions to document publishing to workflow, you're still probably better off today with traditional groupware. But you may want to save money by bringing many of your users in through Web browser connections. If you're willing to start small and you can wait a few months or years, there's a raft of new groupware-related intranet products that are sure to come, and prices are sure to fall.

THE NEW APPLICATION PLATFORM

The most obvious way to start using a corporate intranet is to post HTML-formatted documents on an internal Web server. The tools to create HTML documents or convert documents from other file formats to HTML are inexpensive and easy to use.

But manually translating files into HTML or creating HTML documents from scratch is not the only way to provide content for your internal Web server. We found a number of products available today that you can use to give your intranet a variety of powerful features. Our reviews in the section "Content and Collaboration" concentrate on products that provide group discussion tools and document databases to a Web browser.

We tested products from Digital Equipment Corp., Lundeen & Associates, Microsoft, and net.Genesis that interface with your Web-server software to let intranet users carry on threaded discussions via their Web browsers. We found that while they don't measure up to legacy group-discussion platforms such as Collabra Share and Lotus Notes—they tend to lack the searching, formatting, graphical, and file attachment capabilities of these programs—they work, and improvements will undoubtedly result from upgrades and new products on the market. Digital's Workgroup Web Forum is a standout product in this category.

We also examined add-in products from Electronic Book Technologies, Folio Corp., Information Dimensions, and Lotus Development Corp. that provide access to flat-file document databases via your Web browser. Each of



What's New Online

From April 8 to 12, join Frank J. Derfler, Jr., senior networking editor at *PC Magazine*, and executives from Lotus, Microsoft, and Netscape on the

Web for a discussion on intranets. Go to our home page at <http://www.pcmag.com> and select Discuss on the navigation bar.

these document database products still serves anyone using the existing proprietary client software, but now people can get information through browsers too. These products work by automatically converting information from their proprietary file formats to HTML, often on the fly as the information is requested. Again, we found that with current products, the Web-browser client lacks some bells and whistles found in the proprietary client programs, such as multiple window frames, address books, and online help. And some of the Web-conversion products were extremely expensive—as much as \$25,000 for the software alone—diminishing their allure as low-cost solutions.

We think that many companies will take advantage of the threaded discussion Web-server products, since they are easy to install and use, and relatively inexpensive. Installing a corporate-wide document database, however, is a more strategic decision involving preparation and

planning across many departments. The intranet server link into a document database is more likely to be an adjunct to a standard workgroup installation.

While we found some excellent products that are available right now, our research also turned up significant products from Attachmate, Microsoft, and other companies that are about to be released (see the sidebar "Intranet Beta Watch").

CORPORATE DATABASES: THE SQL

Things can get a lot more complex if you want to use your intranet server to access searched and sorted database records dynamically in SQL or other formats. If your organization has substantial programming expertise, you can create applications conforming to the common gateway interface (CGI) specification that links the Web server to corporate databases. Programmers fluent in C++, Perl, Unix shell scripting, and Microsoft Visual Basic will find ways to hook into the Web-server software.

But this market isn't standing still. Microsoft, Oracle, Sybase, and many smaller companies are working on programs that automatically extract data from corporate databases and convert it to HTML documents on the fly as the data is requested (see the sidebar "Query the Web").

We even found two workflow products—Action Technologies' Action-Workflow Metro and Ultimius's Web-Flow—that can be accessed via Web browsers (see the sidebar "Workflow on the Web").

THE SECURE WEB

Intranets provide the good things of the Internet without the risks of invasion. Hiding your corporate network behind a firewall with Internet connections is like putting a high wall around your city while ceding the highways and harbors to the barbarians. But building a private intranet accessed across the LAN or through a dial-up remote-access server that you run is like living on an island that doesn't appear on any maps. And you can protect it with private phone numbers, modems that dial back pre-programmed numbers for authorized users, and close control over the unique station addresses on the LAN. The barbarians never even see you.

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INTRANET PRODUCTS

Content and Collaboration

It's déjà vu all over again. The wave of organizations setting up intranets today is reminiscent of the move from corporate networks to departmental LANs over the past ten years. But this time the driving force is not so much file-and-print sharing as it is easy access to corporate information. Intranets let organizations share information in nearly any form and help users find exactly what they need.

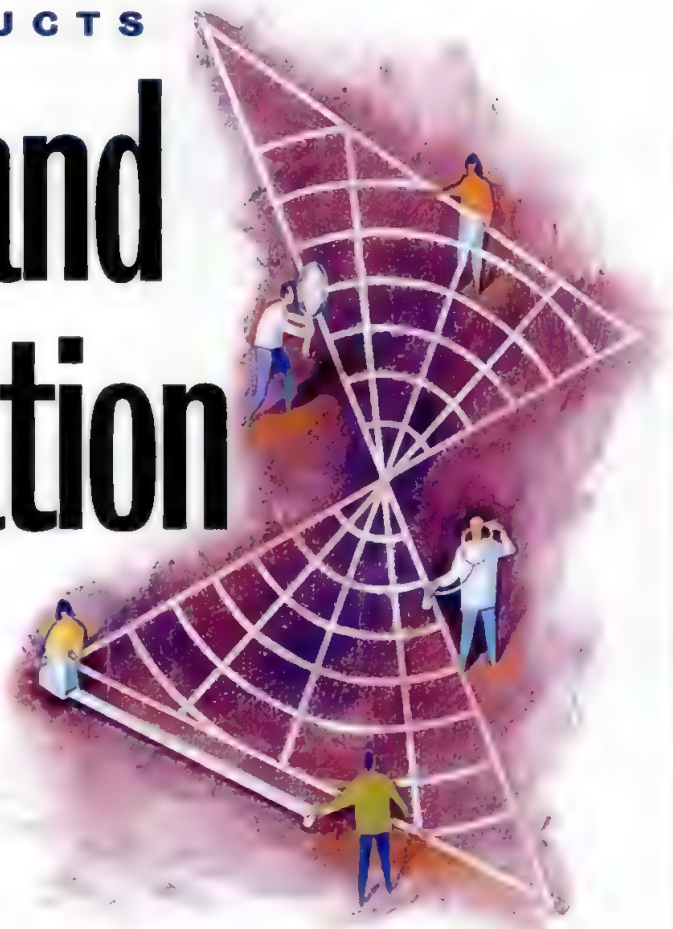
The intranet is also becoming a platform for group discussion. While Internet newsgroups have always provided opportunities for threaded discussions, software is now becoming available for creating threaded discussions on Web pages. Thus there is no need to set up an NNTP (network news transfer protocol) server in addition to your Web server.

For both information access and group discussion, the intranet competes with existing groupware platforms such as Collabra Share and Lotus Notes. The intranet's advantage: In most cases all a user needs is a Web browser. Recognizing this advantage, Collabra, Lotus, and other groupware platform developers are jumping on the intranet bandwagon, providing Web browser access to their systems. While Web browsers are either free or low cost, we found that some intranet products are quite costly—as much as tens of thousands of dollars.

REVIEW CRITERIA

We looked at two categories of products that will prove useful to most corporate intranets—group discussion packages and document databases. From the group discussion camp, we chose products that allow users or administrators to set up and administer discussions that can be accessed via a Web browser.

The resulting test group—which comprises Mi-



Products for accessing group discussions and gigantic document databases via a Web browser are here, but how do they measure up to their legacy competitors?

By Tony Pompili

crosoft FrontPage, net.Genesis's net.Thread, Web Crossing from Lundeen & Associates, and Workgroup Web and Workgroup Web Forum (both from Digital Equipment Corp.)—bears a resemblance in features to our favorite legacy discussion products such as Collabra Share and Open Mind, and the group discussion features of Lotus Notes. The Web-based products we tested, however, did not prove to be as mature in power and ease of use as their legacy brethren, though they were fine as basic discussion

tools. As we went to press, O'Reilly & Associates shipped WebBoard (\$249; <http://software.ora.com>), a discussion product for CGI-compliant Windows 95 and Windows NT Web servers.

The other product group we tested consisted of document databases that provide access via standard Web browsers. These are useful vehicles for storing hundreds or thousands of constantly changing documents and letting intranet users easily search, sort, and retrieve the exact information they need. The products we reviewed—Information Dimensions' Basis Document Manager, Electronic Book Technologies' DynaWeb, Folio Infobase Web Server from Folio Corp., and Lotus's InterNotes Web Publisher—are really legacy information database products with links to Web browsers.

Netscape's much-anticipated Collabra Share-enhanced browser was not available for this review. Also, askSam Systems' askSam Web Publisher, Attachmate's Emissary Workgroup Emcee, Galacticom's Worldgroup, Novell's GroupWise WebAccess, and Searchlight Software's Spinnaker Web Server were still in beta at the time of testing and are discussed in the sidebar "Intranet Beta Watch." As we went to press, we learned of OpenText Corp.'s Livelink Intranet Suite, which the company claims will include document-database, text-search,

group-discussion, and workflow modules. It will be priced at \$12,500 for the first module and \$6,500 for each additional module. While Lotus Notes is famous for its group discussion capabilities, it is essentially a document database. For that reason, we chose to review Notes under our document database category.

GETTING ON THE WEB

All of the products we reviewed give you access from any standard Web browser. Only Digital's Workgroup Web, a discussion product for small workgroups, requires that additional software other than a Web browser be installed on each client. All of the packages—except Workgroup Web (but not Workgroup Web Forum), Folio Infobase Web Server, and DynaWeb—work with a variety of Web servers. Five of the nine packages we tested come with their own Web-server software, and Folio and DynaWeb come with their own single-purpose Web servers. Workgroup Web uses your existing network operating system, not a Web server.

COLLABORATION WISH LIST

In testing our group-discussion products, we looked for features that we're used to seeing in legacy discussion packages, but in many cases we looked in vain. All of the packages except Web Crossing let users view discussions in a

threaded format—arranged by topic with indented responses. But both Digital products require moving through several screens in order to see responses to responses. And Web Crossing has no threads; it arranges messages only in chronological order.

Only Workgroup Web Forum offers participants multiple views (for example, by date) of message threads. And only Digital's products and Microsoft's FrontPage came with message-searching capabilities. Finally, only Workgroup Web and Web Forum allow file attachments.

Recognizing that groups want to limit access to their discussions, we looked at the security features of these products. Digital's Workgroup Web Forum had the best features, with document-, discussion-, and page-level security for each discussion group. Web Crossing and net.Thread give you discussion-level security, and the more general-purpose FrontPage lets you assign access to an entire Web site. Only Workgroup Web Forum and net.Thread allow an administrator to moderate discussions.

These products do not yet measure up to legacy group discussion products, though they do what they do reasonably well. Workgroup Web Forum, our Editors' Choice, comes closest to its legacy competitors. It has file attachments, an excellent interface, and robust security.

HIGHLIGHTS

Intranet Products

You probably have the basic tools to deploy an intranet at your fingertips already: a Web browser and a TCP/IP stack. But transforming the homogeneous world of HTML and Web browsers into useful, interactive applications with which your company can run its business is a daunting task. Some of the products we reviewed provided powerful features and great ease of use; others left us wondering why we would get rid of our classic groupware packages.

Proprietary groupware looked very attractive compared with the slim offerings of some collaboration Web products. In many cases, the intranet products didn't provide the rich features to which we'd grown accustomed, such as attaching documents to a message or editing messages after they had been posted. Also, with some of the document

database add-ons, the Web browser simply acted as a passive viewer. As with other broadcast media, information goes only one way. Finally, as you would have to expect with products that allow universal access, security for the Web-based products was more limited than we would have liked.

Ease of use was readily apparent with these Web products, but with some exceptions. We saw that, for the most part, Internet tools are getting better at shielding administrators and users from the character-based technology that underlies it all. "HTML programmer" will seem as quaint a moniker as "typesetter" as products get smarter and more graphical.

Interoperability is a necessary key in setting up an open intranet architecture; otherwise, you would

be better off with a more powerful proprietary package. With one exception, each of the products we reviewed allowed any Web-browser client to access its services. Some products functioned as single-purpose Web servers and couldn't work with third-party HTTP servers. Some standards—such as the Netscape Server API and the Internet Server API—are already in place for building better back ends.

The overall cost of an intranet system might be more than you expect. While the basic ingredients—Web browsers and servers, HTML authoring tools—are inexpensive, we found that the prices of some of the Web collaboration tools ran to the thousands of dollars. And that's not even taking into consideration the cost of training staff in the system's maintenance and upkeep.

WEB DOCUMENT DATABASES

All of the document-database products we tested are legacy products with the added ability to translate documents and text from their proprietary formats into HTML. In fact, all of the products except InterNotes Web Publisher do HTML translation on the fly in response to queries from the Web browser. InterNotes requires translation of entire databases or documents in batch mode before they can be accessed through a Web browser.

Each of these products also offers a proprietary client for non-Web users. In general, responses to Web-based queries were just a bit more sluggish than queries to proprietary clients, because of the extra time required for on-the-fly HTML translation.

Folio Views and DynaText come from the publishing world and are used primarily by publishers to distribute databases on CD-ROM or electronically. Basis WEB-server is an add-on to the powerful Unix-based Basis Document Manager. And Lotus Notes is a complete groupware platform with powerful collaboration, document management, and workflow tools.

One of the most important features we wanted to see for Web users was powerful search capabilities. All four products offered just that, with full-text search abilities including Boolean and nested searches. But the Basis Document Manager's WEBserver came out ahead with a Thesaurus Manager that enabled system administrators to link like concepts together.

Web clients provided buttons and hypertext links for basic navigation, but usually the proprietary client offered more robust navigation tools. We found that Infobase Web Publisher and Basis Document Manager gave their Web clients the most robust navigation.

System architecture was also important. Both Basis Document Manager and DynaWeb run their Web services on the included Unix Web-server software, which may be a bit intimidating for sites more used to traditional PC-based NOSs. Lotus Notes doesn't come with its own Web server.

Occasionally, you want the database to accept input from users. For example, you may want to create an intranet database that lets Web users register for an upcoming training class. Only Basis Document Manager and Lotus Notes were able to

*Group discussion software:***Workgroup Web Forum***Document database software:***Folio Infobase Web Server**

Information-sharing tools for the Web are proliferating. The best products we looked at give Web-browser clients the rich features you would expect from a typical Windows front end.

Digital Equipment Corp.'s Workgroup Web Forum is our Editors' Choice for Web-based collaborative software. Not only is Forum the most powerful collaboration system of the group, it's also one of the easiest to set up and manage.

Though the other collaborative tools are suitable for casual, ad hoc discussions, Forum has additional features that administrators are used to seeing in classic groupware products. Forum lets you password-protect individual documents, discussions, files, and home pages. It lets users view discussions in multiple views (such as by message author), and it has the most advanced searching features, including Boolean searches.

Forum's document-sharing features were unmatched as well. Documents can be uploaded to the Web server; only Digital's lower-end Workgroup Web includes a similar feature that lets users upload attachments to a shared server. Although Forum, at \$1,995, is more expensive than the

other products, it stands well above them in power, manageability, and user features.

For Web add-ons to document databases, our Editors' Choice is Folio Infobase Web Server from Folio Corp.

Primarily a platform for publishing on CD-ROMs or electronically, the Infobase Web Server automatically and reliably converts Folio Views documents into HTML without any manual style-sheet coding. Of the products reviewed here, it was also

the easiest to set up. Although browsing documents was more powerful with Folio's proprietary client, we found that the hyperlinks in Folio Views translated perfectly into HTML page links.

An honorable mention goes to Lotus's InterNotes Web Publisher. Going beyond browsing, the InterNotes Web Publisher lets Web users interact with Notes via simple HTML forms. InterNotes is easy to set up and use—although with some limitations—and, even better, the next version will be free to users of Lotus Notes Release 4.



allow users to input information that would end up directly in their databases. On the development side, we were looking for products that could be configured for Web access easily. Infobase Web Server and InterNotes Web Publisher could create HTML pages with a minimum of modification, while DynaText and Basis-plus required some work with style sheets to get the conversion working correctly.

In most cases the collaboration and document database products we saw reflect a promising start for intranet groupware applications.

GROUP DISCUSSION SOFTWARE

Microsoft Corp.

Microsoft FrontPage

ALL REVIEWS BY STEVE RIGNEY

As a group-discussion product, Microsoft FrontPage (\$695), from Microsoft Corp., is meager. But as a general-purpose tool, it offers everything you need to set up and maintain your corporate Web. If powerful collaborative tools are your priority, look at Digital's Workgroup Web Forum; but if you want a complete solution for setting up a Web

COLLABORATIVE SOFTWARE

How to Read the Suitability to Task Boxes

Installation and configuration are considered with the assumption that you already have a Web server installed. We expect these collaboration packages to work with most of the popular Web-server software packages. Documentation is weighed, too: How complete is it? We want a simple, graphical installation that requires little or no modification to the Web server. And since we expect the system to work with any Web-browser client, we consider whether proprietary client software is required.

Conferencing features should let Web-browser clients engage in multilevel threaded discussions. We consider how many levels of threading are supported and whether the user can choose multiple

views of the discussion. The discussion interface should be intuitive, with straightforward toolbars and buttons—Web-browser clients shouldn't need a user manual. We also want some sort of indication

SUITABILITY TO TASK

Product name	Power	Ease
Installation and configuration	Poor	Poor
Conferencing	Fair	Fair
Web mastering	Good	Good

of unread messages built into the product. Products that allow users to search messages and add formatted message text are given extra consideration. We look for the capability to insert URLs that point to

other Web sites or files; extra credit is given if the product uploads attached documents and stores them on the server.

Web mastering considers the level of customization and the ease of use of management features. We expect to be able to modify the look and feel of the discussion page, and we evaluate any tools that are included for HTML authoring. Basic features, such as the ability to remove or modify participants' posts, are considered, as are enhanced conferencing features such as real-time polling of users. Finally, we want to be able to set up access rights and passwords from within the product, instead of having to control access via the Web server itself.

site with some group discussion capabilities, FrontPage may be right for you.

FrontPage was originally developed by Vermeer Technologies, which was acquired this January by Microsoft. It includes both a 16-bit HTTP server for Windows 3.x and a 32-bit HTTP server for Windows 95 and Windows NT. (We installed FrontPage on Windows NT.) The server is very easy to install; the only information you have to provide is a user name and password. Microsoft also provides FrontPage server extensions that allow you to edit and maintain Web pages on other Web servers, including WebSite, from O'Reilly & Associates. At the time of this review, however, only the extensions for free Web servers (such as NCSA's) were final. You can download the extensions from Microsoft's Web site.

HEAT AND SERVE

FrontPage provides a unique feature called WebBots, which make it easy to create custom applications on your Web server. The 12 WebBots included with FrontPage are preprogrammed common gateway interface (CGI) scripts that let the Web administrator set up discussion

groups, forms, search engines, or other services on a Web server.

To create a discussion group with the WebBot, you must choose to add a new Web and select the Discussion Web Wizard. Then you configure the Discussion WebBot parameters, including the name of the discussion and its location on the server. In the main view of a discussion you see all posts, with responses indented below.

After the page is saved and activated, other users can participate in the new discussion, create new topics, and respond to messages. Users have no restrictions on the number of responses to responses in the threaded discussion. Except for disk space on your Web server, there is also no limit on the number of topics users can begin. But FrontPage gives users no way to modify messages that have been posted, nor does it allow users to attach files to their messages. The product does not include any formatting tools either; all the messages are entered in plain text. And unlike Workgroup Web Forum, FrontPage does not give users multiple views (for example, by author).

One of the best aspects of the product is the full-featured

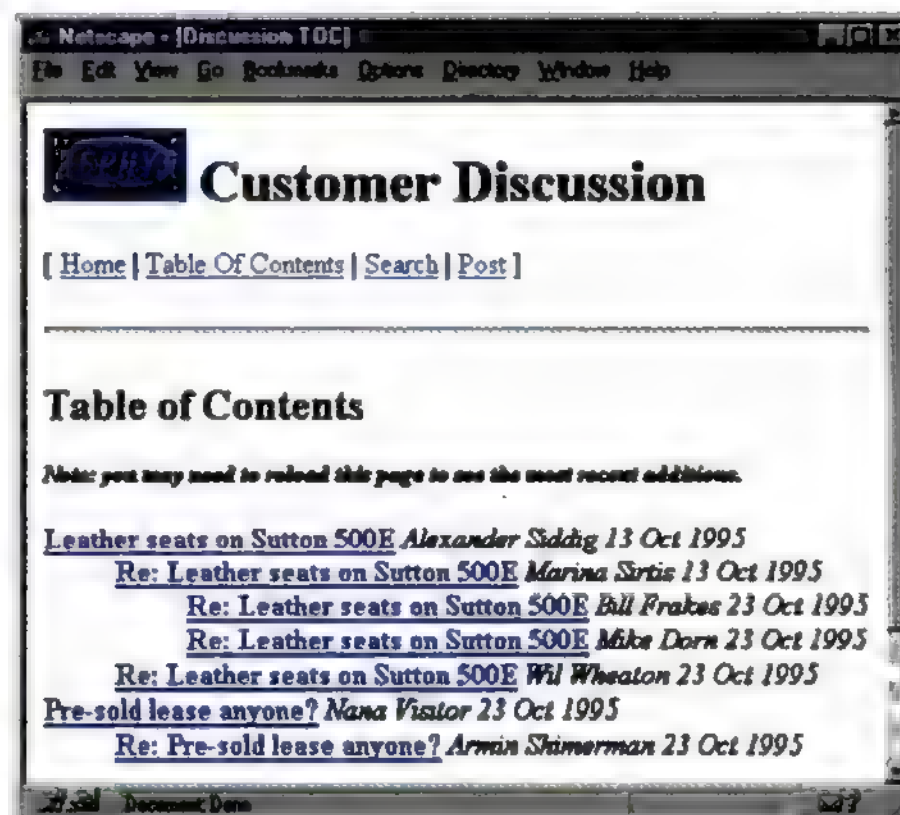
FrontPage Editor. It allows the Web administrator to create sophisticated Web pages without knowing HTML. Everything you type or insert in a page is automatically converted to HTML in the background, though you also can choose to view the HTML tags. The editor resembles a word processor and includes a formatting toolbar and a spell checker.

Creating and maintaining the corporate Web is easy with FrontPage's Web Wizards and Web Templates. Similar to a Wizard in a word processor, the Web Wizards ask you a series of questions to help you create your Web site. Web Templates are canned forms that an ad-

SUITABILITY TO TASK

Microsoft FrontPage

	Power	Ease
Installation and configuration	Good	Excellent
Conferencing	Fair	Fair
Web mastering	Fair	Good



Microsoft FrontPage's WebBots feature lets you set up a threaded discussion with a search option.

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administrator can use to create common Web pages on all servers.

The FrontPage Explorer shows you multiple views of your entire intranet. The outline view in Explorer displays a hierarchical representation of your Web site. Different icons represent different pages, and Explorer even shows you the links between the servers and the pages. From the Explorer you also can set access rights to the Web server, but the security is not as extensive as Workgroup Web Forum's; you can only grant a user complete access to everything on the server or no access at all.

Microsoft FrontPage. List price: \$695. Microsoft Corp., Redmond, WA; 800-426-9400; <http://www.microsoft.com/msoffice/frontpage/index.htm>. Circle 441 on reader service card.

net.Genesis Corp.

net.Thread

Net.Thread 1.1 (\$895 list price) provides basic discussion features, but it lacks such advanced features as file attachments and multiple message views. It was also the most difficult product in this roundup to install. Net.Thread, from net.Genesis Corp., works with any CGI-compliant Windows NT Web server that has the Perl scripting language. Like the other products reviewed here, with the exception of Digital's Workgroup Web, net.Thread is accessible from any forms-capable Web browser with no additional client software needed.

To create a discussion group, you have to log on as the net.Thread Web-

master. The Webmaster screen, which is password-protected, contains tools for editing new discussions, purging messages, and deleting threads. The Webmaster creates a new discussion group using a template. The Webmaster can modify the discussion form to add any plain text (such as "Type your message below"), but to add bold, italic, and bulleted text, or graphics, you have to add HTML code manually.

A nice feature of net.Thread is the ability to set up a moderated discussion group. With this option, the moderator must approve messages before they are posted to the discussion and has the right to alter the messages before they are posted. Participants can see if a particular discussion group is moderated when they join in.

Intranet Beta Watch

By Tony Pompili and Steve Rigney

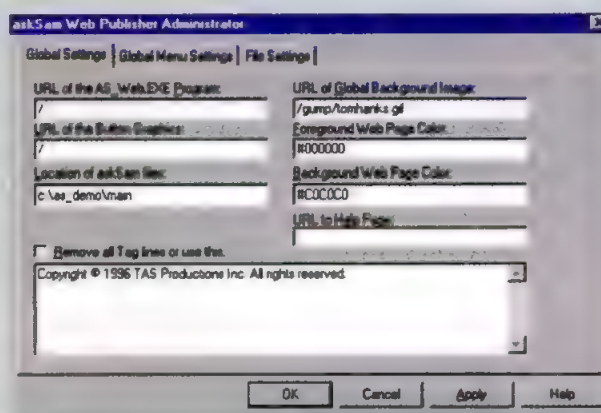
In the course of our review, we came across several vendors that were working on exciting intranet products that were still in beta. Here's a brief look at five products for sharing information on your corporate intranet.

ASKSAM WEB PUBLISHER

AskSam Systems is making its popular flat-file databases available to Web users with its forthcoming askSam Web Publisher. Using any CGI-compliant Windows NT or Windows 95 Web server, the Web Publisher translates askSam 3.0 or askSam 3.0 Professional data into HTML on the fly. The Web Publisher is expected to be shipping by the time you read this and will be priced at \$1,495. (askSam Systems, 800-800-1997; <http://www.asksam.com>. Circle 468 on reader service card.)

EMISSARY WORKGROUP EMCEE

Attachmate, which acquired Internet software vendor The Wollongong Group last year, has integrated the two company's product lines in its Emissary Workgroup Emcee solution. Due to ship in May, the package will include the Emissary Workgroup Server and the Emissary Workgroup Web Gate-



The askSam Web Publisher lets you define global settings for documents that are converted to HTML from an askSam database.

way. (At press time, Attachmate had not yet announced pricing for the products.) You will be able to use Emcee to create group discussions on your Web server, send and receive e-mail and files, and protect your data with strong security options.

Emcee is basically a new version of Attachmate's OpenMind collaboration software that includes hooks to HTML and the CGI specification (for a review of OpenMind, see "Let's Talk," November 21, 1995). The Emcee server includes all of the same features of OpenMind, including e-mail, file shar-

ing, server replication, and group discussions. The Web gateway, which should work with any CGI-compliant server, converts all of the database information from the Emcee format to HTML on the fly when a Web-browser client requests the information. (But the gateway will not translate rich-text format.) Attachmate is also planning to develop Emcee for Web

servers with Microsoft's Internet Server API (ISAPI) and the Netscape Server API (NSAPI). (Attachmate Corp., 800-426-6283; <http://www.attachmate.com>. Circle 469 on reader service card.)

GALACTICOMM WORLDGROUP

BBS vendor Galacticomm has migrated to the Web. Unlike the other products outlined here, Galacticomm Worldgroup requires a client add-on to Netscape Navigator (with versions for other Web browsers coming in the future). You will be able to use Worldgroup, a set of client/server applica-

CONNECTIVITY

Intranet Products

BARE THREADS

When users connect to the net.Thread discussion page, they are prompted for the depth of threads they want to view on the screen. For example, the default depth of threads is three, but you can increase that number if you want to view multiple responses to responses on the same screen. Net.Thread will also place the word "new" by every new message until an administrator-defined interval passes. Unlike Workgroup Web Forum, the product offers no alternate views (such as messages viewed by author). The message entry screen is an HTML form that is not customizable by a user. Any message-formatting by the user must be done manually using HTML. As with FrontPage, users are not limited in the number of messages

tions, and the Web-browser add-on to collaborate across the Internet or your intranet.

The standard Worldgroup product—which is essentially a BBS—includes e-mail, group discussion forums, polls and questionnaires, file libraries, and live-chat features. The Worldgroup Plug-In for Netscape Navigator, expected to be available in April as part of Worldgroup 2.0 (priced at about \$500), is a small application that launches when a user accesses a Worldgroup application embedded in a Web page. (Galacticomm Inc., 800-328-1128; <http://www.galcomm.com>. Circle 470 on reader service card.)

GROUPWISE WEBACCESS

By the time you read this, Novell's GroupWise messaging platform will have added GroupWise WebAccess, programs that allows any Web browser to access a GroupWise in-box via the Internet or an intranet. (At press time, Novell had not announced pricing.) From the Web client, you will be able to send and receive e-mail, schedule meetings, and view files and faxes. The only difference between accessing GroupWise using WebAccess and the regular client is that you aren't able to store mail off-line except as separate HTML or text files.

SUITABILITY TO TASK		
net.Thread		
	Power	Ease
Installation and configuration	Poor	Poor
Conferencing	Good	Good
Web mastering	Fair	Fair

and responses they can post.

Installation was difficult. We found that documentation for net.Thread, which is also available for Unix, insufficiently detailed. In fact, the manual was written for the Unix version with only a short addendum for Windows NT. Additional documentation is available at the company's Web site though. We copied the files from a single floppy disk onto our Web server and then ran the supplied DOS-based Perl script that installed net.Thread. (In our testing, we used the

WebAccess—which includes the WebAccess CGI/HTTP Module and the WebAccess Post Office Module—requires an existing GroupWise Post Office server and any CGI-compliant HTTP server. When Web users log in to WebAccess and request information, the data is converted on the fly to HTML. You can also use WebAccess with Novell's NetWare Web Server if you want to keep your intranet solution on a NetWare platform.

The WebAccess solution is great for users who want to send e-mail and check their schedules easily, but for an administrator it could require a lot of time to set up and to maintain. (Novell Inc., 800-861-2507; <http://www.novell.com>. Circle 471 on reader service card.)

SPINNAKER WEB SERVER

Searchlight has also adapted its BBS software for the Web. Spinnaker Web Server will allow you to publish information (including group discussions, e-mail, and files) from a Searchlight BBS to a CGI-compliant Web server,

version of Perl included with Netscape Communications Server.) After we answered all of the questions, we had to create a CGI directory path on our Web server and give it a URL name. After that, we were ready to set up our discussion groups.

Net.Thread has no security built in but, if the Web server supports it, the administrator can assign user passwords for access to specific pages. The name a user enters appears only as the author of a message and allows the Webmaster to track messages. Users can't delete messages or create discussion pages unless they log on with Webmaster rights.

Net.Thread is a viable solution if you just need to add simple threaded discussions to your Web server. But to enable document attachments in your discus-



The Worldgroup Plug-In for Netscape lets you access Galacticomm's BBS system over a TCP/IP connection.

and vice-versa. And you won't have to be an HTML programmer; Spinnaker converts the data on the fly when a Web client requests it. In addition, you will be able to add CGI-based Web applications to Spinnaker Web Server. Available applications include a conference system, file library, databases, and a game called Webversi. The Spinnaker Web Server should be available for less than \$500 by the time you read this. (Searchlight Software, 800-988-5483; <http://www.searchlight.com>. Circle 472 on reader service card.)

Workflow on the Web

By Steve Rigney

In the main reviews, we look at the corporate intranet as a platform for creating group discussions and sharing data. When you apply the concept of workflow to the intranet, you may be able to get even closer to the goal of a paperless office.

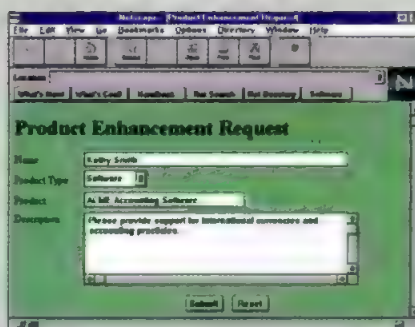
Workflow refers to a standardized sequence of tasks which occur within a company and which have been established to improve efficiency. For instance, a common workflow application is a help desk: When a software company receives a technical support call from a customer, it usually has a standard procedure for entering, tracking, and resolving the question. Applications that automate workflow processes range from very loosely defined systems to highly rule-based systems. Companies that develop popular workflow products include Action Technologies, Lotus, Ultimus, and ViewStar Corp.

Two of these companies have Web-based workflow products: Action Technologies' ActionWorkflow Metro and Ultimus's WebFlow. Unfortunately, Action doesn't include an installation program for Metro and the company would not let us try to install it. In the end, we had to settle for a demonstration of Metro. Also, although we got a hands-on look at WebFlow, the product was in beta at the time of our review.

Metro is the more expensive product, but it provides a number of applications in a completely native Web solution, and its ability to track each step of the workflow process is powerful. Ultimus's WebFlow is easy to use and less expensive, but it only makes use of the Web for launching workflow processes, not tracking them.

ACTIONWORKFLOW METRO

The first thing you will notice about ActionWorkflow Metro is its price tag. The standard Metro Application Center package, which includes 20 workflow applications and unlimited user



With Ultimus's WebFlow add-on, any client with a Web browser can submit a workflow request.

licenses, carries a \$40,000 retail price (not including installation and training). Separately, Action Technologies also sells the \$40,000 Metro Development Center, which lets you write custom workflow applications. Metro runs on Windows NT Server and requires Microsoft SQL Server and Netscape Commerce Server or Communications Server, none of which are included.

Why would you consider Metro, given its hefty price? As a native Web solution, it provides an easy way to let your customers and employees access workflow applications using any standard Web browser instead of a licensed client for each desktop, according to Action Technologies. Users outside the company can more easily participate in the workflow from any Web browser. Metro also includes 20 canned workflow applications, whereas Lotus Notes only has templates that need to be customized.

Metro allows any standard Web browser to become a full client to the workflow applications on the Internet or a corporate intranet. For example, an external client can submit a request for technical support via a Web site. That same customer could reconnect later to see the status of the request—whether it's been serviced, declined, or sent to someone for consideration.

In addition to the customer service workflow application, the Metro Appli-

cation Center includes Web workflow solutions for sales, marketing, human resources, finance, and accounting departments. If one of the included applications doesn't suit your needs, you can buy the Metro Development Center. (Action Technologies Inc., 800-967-5356; <http://www.actiontech.com>. Circle 473 on reader service card.)

ULTIMUS WORKFLOW STARTER KIT

The Ultimus Workflow Starter Kit with WebFlow sells \$3,345. The package includes Ultimus's engine, WebFlow, designer modules, and five client packages. Whereas Metro uses an SQL database to route the various steps of a workflow, Ultimus relies on your existing e-mail infrastructure.

WebFlow, which generates e-mail based on requests from Web browsers, currently works only with MAPI-compliant e-mail systems, but the shipping version of the product should include support for vendor-independent messaging (VIM) systems, such as Lotus Notes and cc:Mail. WebFlow requires a Netscape Web server.

You can set up Ultimus WebFlow to allow anyone to initiate workflow action via a Web browser. But unlike Metro, Web users cannot track the workflow process (although Ultimus' full client users can check a request's status and generate reports).

Ultimus is as easy as any standard Windows application to set up and configure. The WebFlow application is on just one disk, and the main Ultimus workflow program is on five disks.

The Workflow Starter Kit includes a forms designer and a graphical design interface that lets you define workflow rules. For Web users, WebFlow automatically converts the workflow forms to HTML. As long as you have an e-mail system installed and working, you should not have any trouble with the WebFlow setup. (Ultimus, 919-233-7331; <http://www.ultimus1.com>. Circle 474 on reader service card.)

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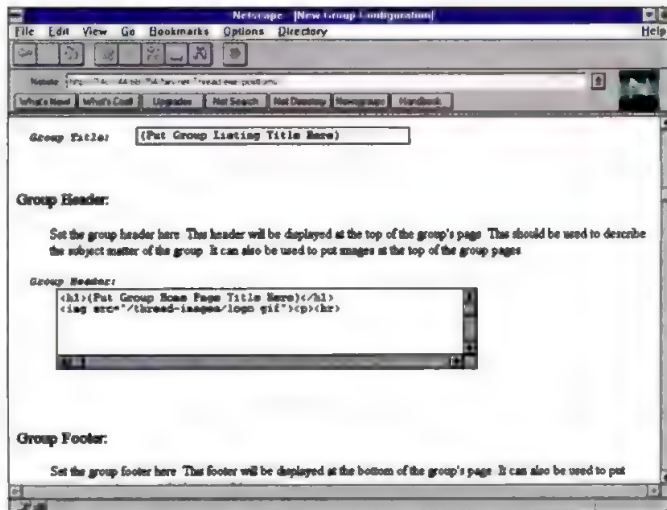


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You need to format HTML manually to create a group discussion with **net.Thread**.

sions or to provide multiple views of the discussion threads, Workgroup Web Forum is a better solution.

net.Thread 1.1. List price: \$895 (Windows NT version). net.Genesis Corp, Cambridge, MA; 617-577-9800; fax, 617-577-9850; <http://www.netgen.com>. **Circle 442** on reader service card.

Lundeen & Associates Web Crossing

Like the other discussion products in this review, Web Crossing (\$395) is a Web server add-on that allows you to create easy-to-use discussion groups. But Web Crossing takes a different approach: Each conversation topic is presented in a long, chronological list instead of as a threaded series of messages and replies. This makes Web Crossing more of a group forum product than a threaded discussion utility.

Lundeen & Associates has a complete guided tour on its Web site that demonstrates the features of Web crossing and includes a sample discussion page. We recommend that you take the tour before you start using the product.

Lundeen & Associates currently sells versions of Web Crossing for Windows NT Server and Macintosh servers (which work with Netscape's Web servers), and the company is working on a Unix solution. We tested the Windows NT version. The product is fairly easy to install, but documentation is limited to a short

start creating discussion pages. Web Crossing lets users register individual accounts, so that the server can track messages, telling each user which messages have been read and which haven't. Each participant must specify a user name and password; optionally, users can upload a picture and include e-mail and home page addresses. Web Crossing also gives the administrator the option of permitting guest access, which allows users to post anonymously and doesn't track which messages are unread. To participate in a discussion, click on the name of the group from the main discussion page and you see all of the participants and their messages.

Only the Web master is able to create a new discussion page (although any user can initiate a new topic on the page). This version of Web Crossing has no individual or group password settings; rights for general users are granted to all or none. Security for access to the discussion pages must be implemented through your Web server.

HTML document. To install the product, the administrator copies the files to the Web server's hard disk and then launches the Web Crossing CGI script. The CGI script allows the Web administrator to set up discussion groups and add information such as users' names and the administrator's password.

After completing the installation process, you can

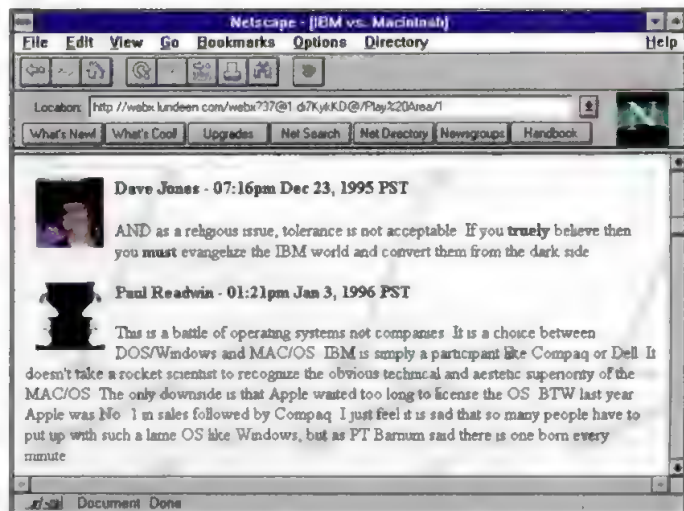
SUITABILITY TO TASK		
Web Crossing		
	Power	Ease
Installation and configuration	Fair	Fair
Conferencing	Fair	Fair
Web mastering	Fair	Fair

LAUNDRY LIST

One of the main drawbacks of Web Crossing is that it doesn't allow responses to appear directly under the messages they're responding to. You can only append a message to the bottom of the list. A useful feature, though, is the Web Crossing subscription feature, which lets registered users view only messages they have not read.

Similar to Workgroup Web Forum, Web Crossing includes several buttons on the discussion pages (Post, Edit, Add Topic, and E-Mail Sysop) that make it easy to create new messages. All of the messages are stored in a proprietary format, then translated to HTML on the fly when accessed by a user. Web Crossing offers a basic HTML editor that allows you to add bold and italic text as well as bullets, but you will have to enter HTML code manually if you want to attach a hot link to a file or insert a graphic. Web Crossing lets participants edit messages up to 30 minutes after they're posted and delete their own messages at any time—something that no other reviewed product allows for every user.

Web Crossing will do the job if you're looking for the electronic equivalent of a



Web Crossing messages appear in a single list in chronological order, instead of as a threaded discussion.

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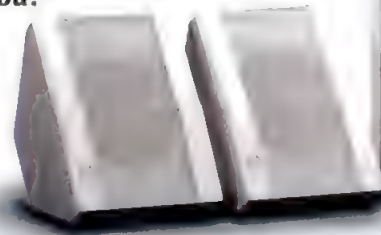
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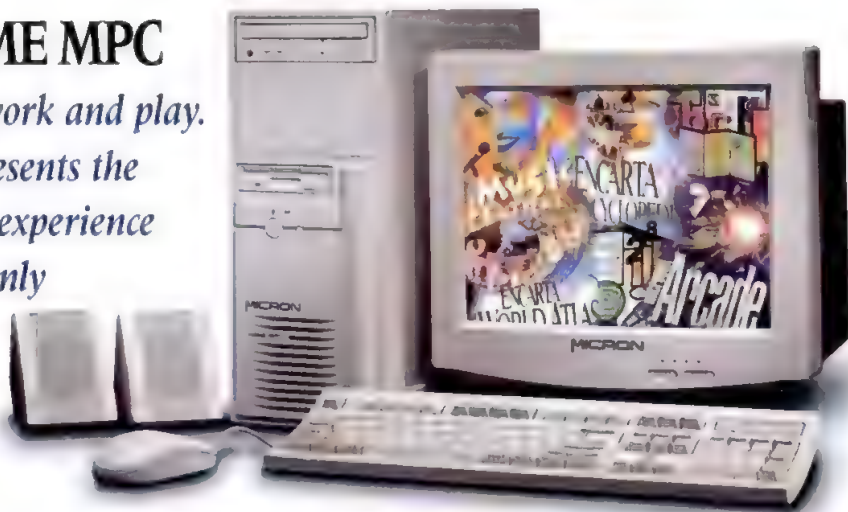
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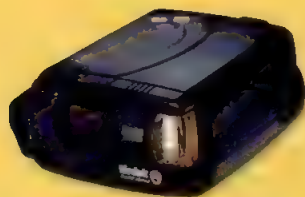
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bulletin board, but if you need true threaded discussions and the ability to attach documents you should look elsewhere.

Web Crossing. List price: \$395. Lundeen & Associates, Alameda, CA; 510-521-5855; fax, 510-522-6647; <http://webx.lundeen.com>. Circle 443 on reader service card.

Digital Equipment Corp.

Workgroup Web, Workgroup Web Forum



With good management features, easy installation, and powerful discussion tools, Workgroup Web Forum, from Digital Equipment Corp., was the best of the collaborative products we reviewed. Its lesser cousin, Workgroup Web is geared toward small workgroups that want to set up ad-hoc group discussions and shared folders on any network file server.

To access discussions, Workgroup Web users need a combination of proprietary client software from Digital and a standard Web browser. No web server is required. Intended for larger installations, Workgroup Web Forum (\$1,995) requires a Web server and a TCP/IP network, but no client software other than a standard Web browser is necessary for accessing discussions.

WORKGROUP WEB

Of the products we looked at in this roundup, Workgroup Web (\$99 for a single user, \$799 for 10 users), was among the easiest to set up. With the basic Workgroup Web, you don't need to install a Web server or even the TCP/IP network protocol; you can use virtually any network operating system.

Although it works with any Web browser, Workgroup Web requires that users first install its version of Enhanced Mosaic 2.0 (licensed from Spyglass). To enable another browser for collaboration, within that browser you must associate the Workgroup Web extension (.WBL) with Digital's WGWEB.EXE program. After you do this, you are able to access the message-posting and searching tools, which must remain installed on every client. Workgroup Web was the only prod-

SUMMARY OF FEATURES

Collaborative Software

PC MAGAZINE
EDITORS' CHOICE

■ YES ■ NO	Microsoft FrontPage	net.Thread 1.1	Web Crossing	Workgroup Web	Workgroup Web Forum
Products listed in alphabetical order					
List price	\$695	\$895	\$395	1 unit, \$99; 10 units, \$799	\$1,995
Required RAM	12MB	Depends on Web server	4MB	10MB	20MB
Required hard disk space	16MB	100K	2MB	5MB	8MB
Includes Web-server software	■	■	■	N/A ¹	■
Works with third-party Web servers	■	■	■	N/A ¹	■
NOS Support					
Netware 3.x/4.x	■ ■	■ ■	■ ■	■ ■	■ ■
Windows 95/Windows NT	■ ■	■ ■	■ ■	■ ■	■ ■
Windows for Workgroups	■ ■	■ ■	■ ■	■ ■	■ ■
Macintosh System 7.x	■ ■	■ ■	■ ■	■ ■	■ ■
Sun Solaris	Optional	■ ■	■ ■	■ ■	■ ■
SCO OpenServer	■ ■	■ ■	■ ■	■ ■	■ ■
OS/2 LAN Server	■ ■	■ ■	■ ■	■ ■	■ ■
Digital Pathworks	■ ■	■ ■	■ ■	■ ■	■ ■
Runs over TCP/IP, IPX	■ ■	■ ■	■ ■	■ ■	■ ■
Supported Browsers					
Microsoft Internet Explorer	■ ■	■ ■	■ ■	■ ■	■ ■
NCSA Mosaic	■ ■	■ ■	■ ■	■ ■	■ ■
Netscape Navigator	■ ■	■ ■	■ ■	■ ■	■ ■
Proprietary client software not needed	■ ■	■ ■	■ ■	■ ■	■ ■
Collaborative Features					
User can post messages	■ ■	■ ■	■ ■	■ ■	■ ■
Threaded discussions:					
Allows responses	■ ■	■ ■	■ ■	■ ■	■ ■
Allows responses to responses	■ ■	■ ■	■ ■	■ ■	■ ■
Message content:					
Rich text/Graphics/Forms	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Text/binary attachments	■ ■	■ ■	■ ■	■ ■	■ ■
Hypertext/URL links	■ ■	■ ■	■ ■	■ ■	■ ■
Opinion polls/Polling reports	■ ■	■ ■	■ ■	■ ■	■ ■
Types of searches:					
By database/topic/full text	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Boolean	■ ■	■ ■	■ ■	■ ■	■ ■
User can move threads within/between databases	■ ■	■ ■	■ ■	■ ■	■ ■
Types of views:					
By thread order	■ ■	■ ■	■ ■	■ ■	■ ■
By date	■ ■	■ ■	■ ■	■ ■	■ ■
By author	■ ■	■ ■	■ ■	■ ■	■ ■
Alerts user to new messages	■ ■	■ ■	■ ■	■ ■	■ ■
Web authoring tools/templates provided	■ ■	■ ■	■ ■	■ ■	■ ■
MAPI/SMTP links	■ ■	■ ■	■ ■	■ ■	■ ■
User can modify messages after posting	■ ■	■ ■	■ ■	■ ■	■ ■
Management					
Password protection	■ ■	■ ■	■ ■	N/A ²	■ ■
Manager/user can:					
Set up discussion databases	■ ■	■ ■	■ ■	■ ■	■ ■
Assign access rights to individual databases	■ ■	■ ■	■ ■	N/A ²	■ ■
Assign multiple levels of access rights	■ ■	■ ■	■ ■	N/A ²	■ ■
Create custom templates	■ ■	■ ■	■ ■	■ ■	■ ■
Create custom buttons	■ ■	■ ■	■ ■	■ ■	■ ■
Manager can delete messages	■ ■	■ ■	■ ■	■ ■	■ ■

N/A¹—Not applicable. The product does not use Web servers. N/A²—Not applicable. The product uses existing NOS user rights.

The Webbed Suites

By Steve Rigney

Now that you've set up your intranet, and your users can share information using simple Web browsers, what do you do with your desktop applications? Maybe you need to upgrade them. Lotus, Microsoft, and Corel—which recently purchased Novell's PerfectOffice suite—have either added Internet hooks into the latest versions of their desktop suites or else plan to in upcoming releases.

Many people prefer to compose and edit documents using their word processors, graphics programs, and databases. But users haven't been able to share or collaborate on those documents without having the same applications—and, in some cases, the same version. Here's a summary of how vendors are integrating Web software into their suites to make collaborating easier.

LOTUS SMARTSUITE 96

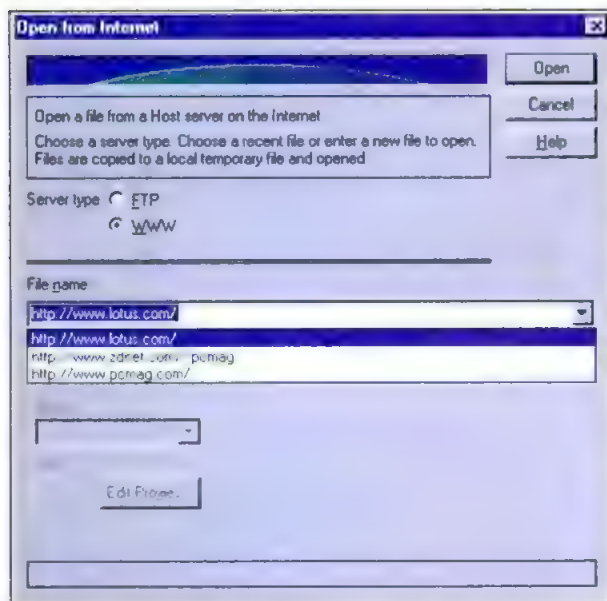
Lotus designed SmartSuite 96 for Windows 95 to allow users to access, share, and publish information across the

Internet and a corporate intranet. With an optional Web browser, HTML editor, and a database of 500 Web sites, SmartSuite is definitely an intranet-ready desktop suite.

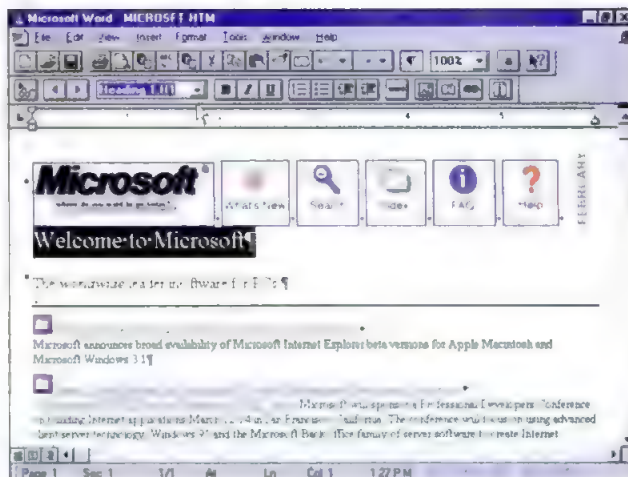
The most apparent Web hook in SmartSuite is the optional Global Network Navigator Web browser from America Online; it includes 30 days of free Internet connect time. From any SmartSuite application document, you can launch a URL by clicking a toolbar button. The Global Network Navigator browser is also available in SmartSuite 4.0 for Windows 3.1.

SmartSuite also includes an HTML editor for the WordPro word processor and for Freelance Graphics applications. You can use WordPro to edit and save HTML-based pages; Word-

Pro's HTML tools are included in the shipping version of the suite. WordPro also lets you open Web and FTP URLs to function as a limited browser. Freelance lets you save presentations into linked HTML pages. You simply create a document using standard text and graphics, and SmartSuite automatically converts the information into HTML format. (Lotus Development Corp., 800-343-5414; <http://www.lotus.com>. Circle 475 on reader service card.)



Lotus's WordPro can function as both an HTML editor and a rudimentary browser for accessing FTP or Web sites.



Internet Assistant for Microsoft Word adds rudimentary HTML editing tools to Word.

MICROSOFT OFFICE FOR WINDOWS 95

Predictably, Microsoft has also added Internet and intranet tools to its Microsoft Office suite. The suite's applications have a software layer called DocObjects, and Microsoft is making available free Internet Assistants—fully integrated HTML editors—for Excel, PowerPoint, and Word. And for intranet users who don't have the suite, Microsoft offers free standalone viewers for each of the Office applications as well.

DocObjects—part of Microsoft's OLE 2.0 specification—are the most important pieces of Microsoft's strategy: These components allow your intranet and desktop applications to be aware of one another. For example, if you are using Microsoft's Internet Explorer to view a Web page and you come across a link to a Word document, the DocObjects technology automatically launches Word.

Microsoft also provides free Internet Assistants for Excel, PowerPoint, and Word so that you can save and edit documents in HTML. But unlike Lotus SmartSuite, these HTML tools are not currently included in the shipping product; you must either order them separately or download them yourself.

The free viewers for the Office

applications will let you view and print Excel, PowerPoint, or Word documents. For example, if there is a link to a Word document on a page you are browsing, you can click on the document link to launch the viewer. Excel and Word viewers for Windows 3.x and Windows 95 and a PowerPoint viewer for Windows 95 are available now from Microsoft's Web site and online services. But only compared with the full apps do they look slim—the Excel and Word viewers each take up 3MB of hard-disk space. (Microsoft Corp., 800-426-9400; <http://www.microsoft.com/msoffice>. Circle 476 on reader service card.)

PERFECTOFFICE

As we went to press, Corel and Novell announced the sale of most of the PerfectOffice suite to Corel. Novell retained ownership of GroupWise messaging and the Envoy portable document technology, which Corel will license to be part of PerfectOffice. Novell plans to have GroupWise WebAccess available by the time you read this, which will let a GroupWise user read and send mail from any Web browser (see the sidebar "Intranet Beta Watch").

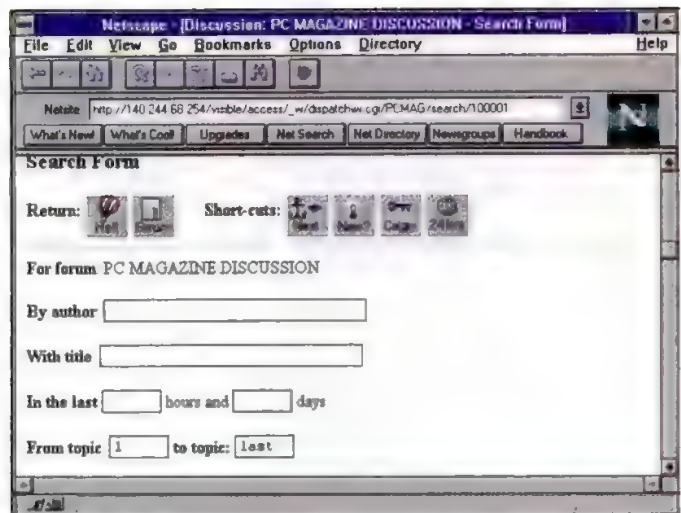
In PerfectOffice 7, due to be released by the middle of this year, Corel plans to include several Internet hooks. The suite will include Netscape Navigator 2.0, and each of the suite applications will include a URL linking capability to launch the browser when the user clicks on a Web address in a document. Both WordPerfect and Quattro Pro will be able to edit and save documents in native HTML, or save existing documents in HTML. Also, in Quattro Pro spreadsheets, users will be able to link formulas in cells to HTML documents. For sharing documents with non-PerfectOffice users, the free Envoy Viewer is available as a standalone application from Novell's Web site or as a Netscape Navigator 2.0 plug-in. (Corel Corp., 800-772-6735; <http://www.corel.ca>. Circle 477 on reader service card.)

uct we reviewed that requires any proprietary software in addition to the standard Web-browser client

After you have installed the client tools for Workgroup Web, using the product is simple. To start a discussion, the administrator must first use the Workgroup Web interface to define a discussion folder, which is an HTML file in a shared directory on the file server. Any user can then post messages and replies and insert pointers to documents in the existing discussion folder. The administrator can set up several discussions folders, and new users simply point their browsers to the starting HTML page (or file) in the shared directory. Although the discussions are threaded, you are able to view only direct responses to each message on a single screen (unlike net.Thread and FrontPage for Windows, which show multiple levels of responses on the same screen). Users cannot add bold or italic text formatting or any other fonts—Workgroup Web does not recognize HTML in the message fields.

The standard interface of Workgroup Web consists of a toolbar with buttons for creating, posting, and replying to the messages. You can also search on keywords and phrases; Workgroup Web finds all of the messages that meet your search criteria and lists them on a separate Web page with hot links to the original pages. Users are not limited to the number of messages and responses they can post. But unlike Web Crossing, the Workgroup Web tools don't offer any way for participants to modify or delete their comments once posted.

Security for Workgroup Web is primitive. Since Workgroup Web uses the security provided by the NOS, any user who has the appropriate rights can manually alter any other participant's post. You can also delete messages that have



Workgroup Web Forum's built-in search function lets you search all posted messages.

been posted, but this will corrupt the links to that message from other messages in the thread. The only way an administrator can prevent users from changing or deleting files is to assign read-only access to the entire directory. And, unlike Workgroup Web Forum, there is no way to password-protect individual pages, files, or discussions.

In addition to the threaded discussions, you can use shared folders to post file attachments. If a user chooses to attach a file, the file is copied, in its original format, to the shared directory—a feature unique among the products we reviewed. Files attached in this manner, however, cannot be modified. If a user wants to attach a file and keep it updated, the user can insert an HTML pointer to a file that resides on a shared server. Unlike net.Thread and Web Crossing, you don't have to write an HTML hot link to link to files; you simply select the Add button from the toolbar and choose the file you want to include. You can also insert a URL for a direct link to a World Wide Web site if users have both TCP/IP installed and Internet access..

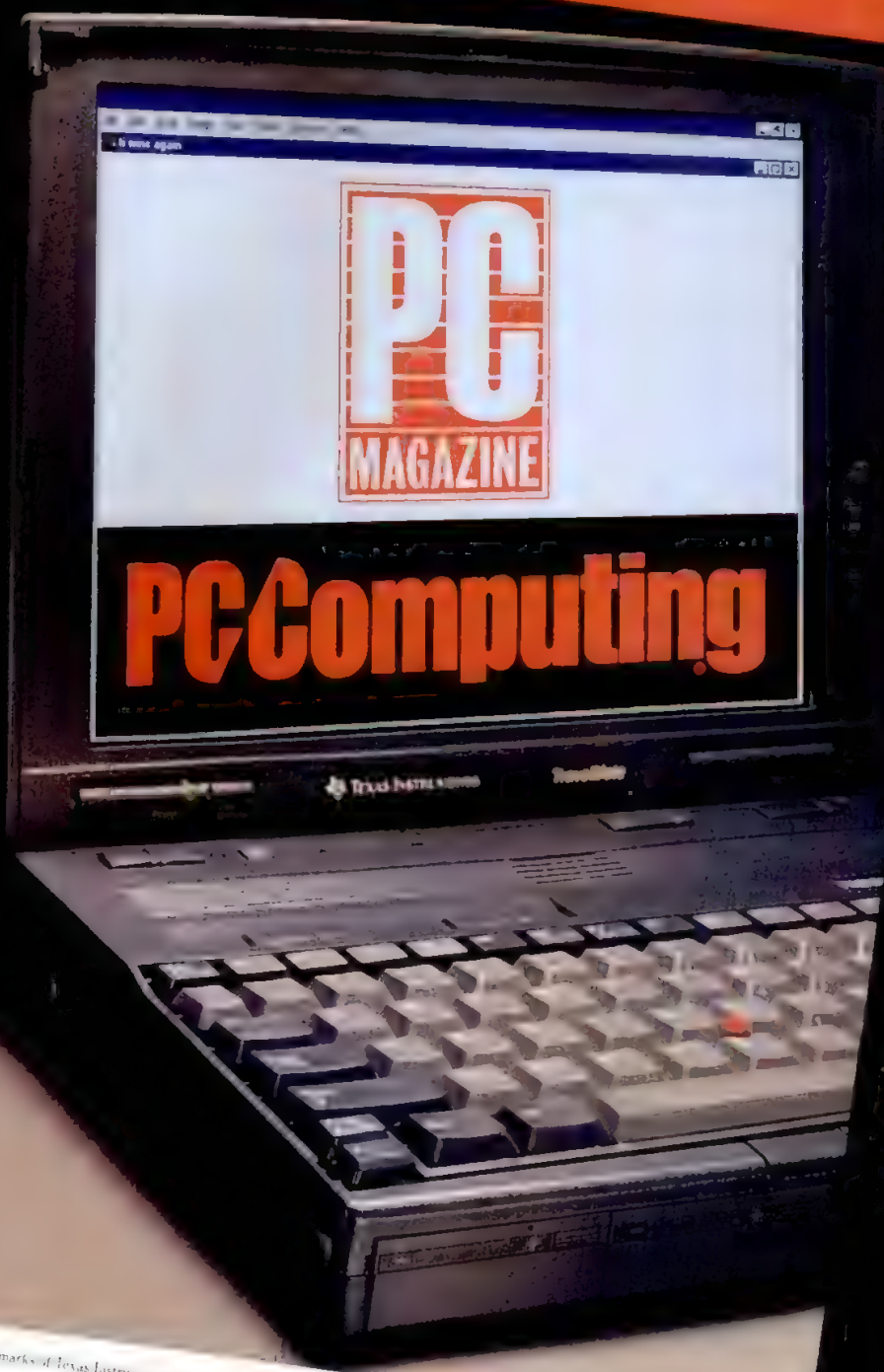
WORKGROUP WEB FORUM

While it has features similar to Workgroup Web's, Workgroup Web Forum does not require any proprietary client software, which means that any PC, Macintosh, or Unix forms-capable Web browser can use it. Forum runs as an add-on to an existing Web server and current-

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Query the Web

By Tony Pompili

Many businesses rely on database management systems (DBMSs) to store mission-critical data. As Internet technology gains a greater foothold in computing environments, vendors are responding with tools to link DBMSs to Web servers, providing more flexible access to corporate data. In the last few months, Computer Associates, Informix, Microsoft, Oracle, and Sybase have introduced a flurry of Web-to-database access products.

As you might expect, these vendors' products generally provide Web access to their own databases. But middleware products such as Allaire Corp.'s Cold Fusion Professional 1.5 (\$495) are providing interoperable solutions. Cold Fusion lets developers create complex Web applications that can issue generic SQL queries to a DBMS. Programming features of Cold Fusion include conditionals, loops, and programmer-defined functions, as well as field validation.

But products developed directly by DBMS vendors can provide more direct access to database features. The basic architecture is the same for each of them: A Web-browser user enters static or dynamic SQL queries via HTML forms. Through API or CGI calls, the Web server submits the form to a DBMS agent, which converts the form into a database-specific SQL query. The database results are formatted into HTML and returned through the API or CGI gateway to the Web server and back to the browser.

Database king Oracle offers WebServer (\$2,495 for Version 2.0; Version 1.0 is free with Oracle7), a group of applications—including an integrated HTTP server—that give Web-browser users live access to Oracle7 databases. The WebServer includes Oracle Web Agent and Oracle Web Listener for converting HTML forms to queries and sending result sets to the Web server. Additionally, WebServer HTML pages can point to Oracle7

PL/SQL procedures, giving developers access to existing libraries of procedures. As an extension to Oracle7 servers, the Oracle WebServer will offer added security with authentication and encrypted data streams.

Oracle also offers Developer/2000, a set of Web application development tools for its InterOffice multimedia and application workflow product suite. The product, which runs on Windows NT, Windows 95, and Macintosh clients, lets developers build Web applications that tap into InterOffice data and applications.

The Microsoft Internet Information

to access an SQL-server database. (No software is included in the price.)

Sybase's web.sql (\$1,200 to \$1,500 per license depending on the network operating system and the number of processors) also gives developers HTML-to-SQL-database links. web.sql works with any Sybase database and can also work with third-party SQL DBMSs using Sybase's Open Client API and Enterprise Connect middleware products. With web.sql, developers embed SQL statements in HTML forms, which are then passed to a DBMS server. Sybase has announced a development suite, Opti-

SUMMARY OF FEATURES

Web-to-Database Connectivity Tools

■ YES NO	Allaire Corp. Cold Fusion Professional 1.5	Computer Associates OpenIngres/ICE	Oracle Corp. WebServer	Sybase Inc. web.sql
Products listed in alphabetical order				
List price	\$495	\$1,600	\$2,495	\$5,000
Platforms supported	Windows 95, Windows NT	Unix, Windows NT	Unix, Windows NT	Sun Solaris
Web server included	None	None	Oracle Web Listener	None
Gateways or APIs supported	CGI, ISAPI	CGI	CGI	CGI, NSAPI
DBMSs or standards supported	ODBC	ODBC, OpenIngres	Oracle7	OpenConnect, System 10, System 11
Includes HTML authoring tools		■		
Phone number	612-831-1808	800-225-5224	800-423-0166	800-792-2731
Fax number	612-830-1090	516-342-6868	415-506-7200	415-922-9441
Web address	http://www.allaire.com	http://www.cai.com	http://www.oracle.com	http://www.sybase.com

Server—which at press time was free to download—includes the Internet Database Connector. This Internet Server API (ISAPI) application lets the Internet Information Server access an ODBC-compliant database (such as SQL Server) directly. Both Internet Information Server and SQL Server run only on Windows NT Server. SQL Server 6.5, in beta at the time of this article, is slated to include a feature for automatically converting database information into HTML.

Separately, Microsoft announced the Microsoft SQL Server Internet Connector license, which should be available by the time you read this. Priced at \$2,995 per server, the license allows unlimited number of Web users

ma++, for creating both client/server and Internet applications.

Computer Associates is aiming its Web product at commercial Internet sites in addition to intranets. CA-OpenIngres/ICE (Internet Commerce Enabled) generates dynamic HTML forms with SQL queries and includes a feature that lets an application notify a user when a specified condition has been met. CA-OpenIngres/ICE (\$1,600) includes a Web server and built-in access security.

Informix is melding multimedia database technology with the Web. Expected later this year, the Informix Universal Server will support multimedia objects, such as images, sound, and video, as well as HTML pages.

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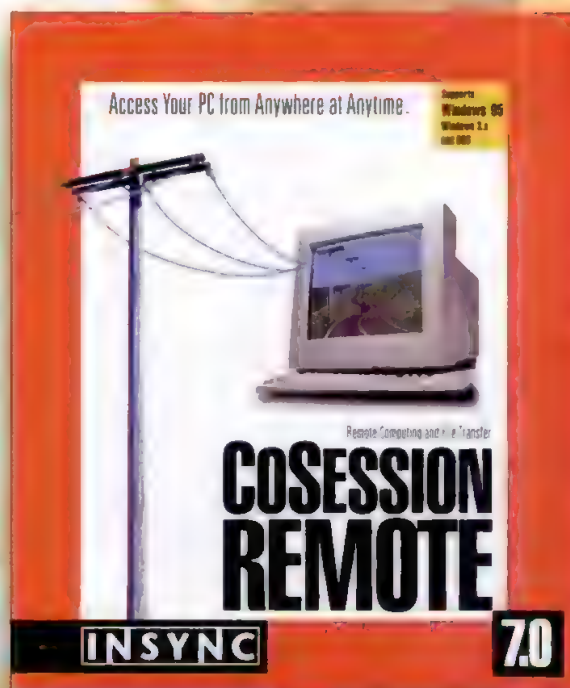
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SUITABILITY TO TASK

Workgroup Web

	Power	Ease
Installation and configuration	Good	Good
Conferencing	Excellent	Excellent
Web mastering	Fair	Fair

SUITABILITY TO TASK

Workgroup Web Forum

	Power	Ease
Installation and configuration	Good	Good
Conferencing	Excellent	Excellent
Web mastering	Good	Good

ly works with Digital Unix, or Windows NT running either the NCSA, Netscape, or Process Software Web servers. The installation was simple for both operating systems. All you have to do is configure your Web server to point to the Forum HTTP pages.

Forum provides more searching options than the low-end Workgroup Web; they include a faster search engine and the ability to search using Boolean terms. And the group discussions are not limited to plain text; Forum supports HTML formatting, but you must add the codes manually. Like Workgroup Web, you can attach documents by uploading them to the Web server in their original format, and you can insert URL pointers to other Web servers.

A unique polling feature included with Forum makes it easy to tabulate group decisions. An administrator can gather and

track responses to specific questions and even create a graphical chart to show how users have voted. All of the polling is done in real time.

In addition to the basic security from the Web server—you must have rights to access the Web server in order to even see the Forum page—Forum lets you password-protect individual documents, discussions, files, and home pages.

Forum offers a moderator feature, not available with Workgroup Web, that lets you choose which messages to post and edit users' replies. Another advantage of Forum is its ability to customize the user interface. Though the default interface offers the standard tools a user wants, you can also add new buttons and views. Unlike the other products we looked at, users can access discussions in any number of views, such as by author or by date.

While Forum is more expensive than Workgroup Web and requires both an HTTP server and a TCP/IP network, it provides an open solution with flexibility and manageability. Because of its more limited features, the quick and low-cost Workgroup Web is best for a small number of users.

Workgroup Web. List price: Single user, \$99; 10 users, \$799. **Workgroup Web Forum.** List price: \$1,995. Digital Equipment Corp., Maynard, MA; 800-344-4825; fax, 508-493-8780; <http://www.digital.com>. Circle 444 on reader service card.

DOCUMENT DATABASE SOFTWARE

Information Dimensions Inc.

Basis Document Manager

ALL REVIEWS BY TONY POMPILI

Basis Document Manager (\$25,000), from Information Dimensions, is a powerful high-end information distribution system that runs on Unix. Like the other products we tested, the Basis Webserver (included in the \$25,000 bundle) provides access on the fly to the Basis Document Manager's document database from any Web browser, complete with rich text and graphics. But it goes a step further by giving Web users some interface enhancements and hypertext links not in the original Windows client. Only Unix users will be comfortable installing this product; however, Information Dimensions expects to have a Windows NT Server version by the end of the year.

Basisplus, a modified relational database system with a client/server architecture, is the core of the Basis Document Manager system. With Basisplus, Basis Desktop users can store and retrieve more than 200 document types (such as Lotus WordPro or .PCX) in their original formats. The Basis Desktop runs on Windows 3.1, and the server can run on multiple Unix systems although some database creation and maintenance tasks can be performed from the Windows client.

We tested Basis Document Manager,

DOCUMENT DATABASES

How to Read the Suitability to Task Boxes

Installation and configuration for these Web add-on products must be explained in clear and straightforward documentation, as well as in additional online help. The product should include an HTTP server that integrates smoothly with the document database, but we also like having the option to use the Web server of our choice. For configuring the system, the Web product should integrate smoothly with the existing document database without requiring the administrator to manually convert or copy files. Extra consideration is given if the product automatically converts the document databases into HTML without first requiring manual coding of style sheets. Finally, we want effective, integrated management tools for monitoring and updating the system.

Database accessibility addresses the functionality the products give to Web-browser clients. When accessing a document database via a Web browser, we want to have the same options as the system's

SUITABILITY TO TASK

Product name

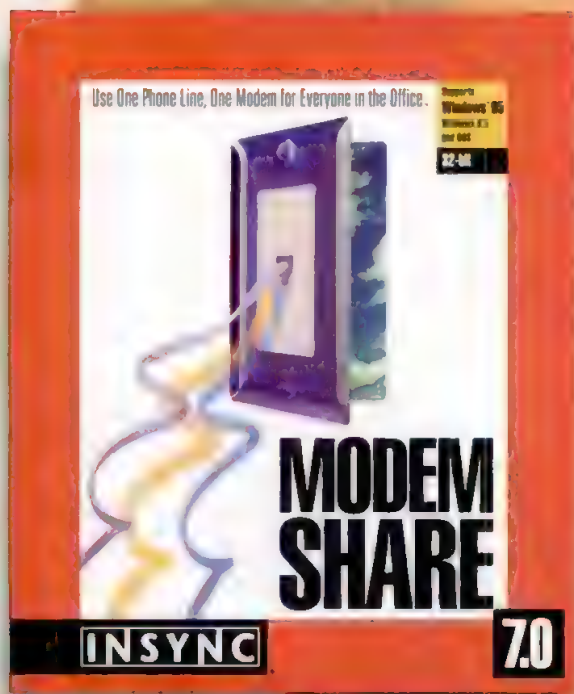
	Power	Ease
Installation and configuration	Poor	Poor
Database accessibility	Fair	Fair
Customization	Good	Good

proprietary clients. We consider what type of content does not get translated into HTML, as well as whether or not Web-browser clients have access to search features. We also compare the ease and

power of the navigation features offered to Web clients with those available to the proprietary viewers. Although it is not mandatory, we also consider the ability of the system to support Web-browser input via forms.

Customization measures the tools and features offered by the products for modifying the look and feel of the HTML pages. We look at what tools are included to allow the administrator to configure the standard document formats as well as the default home page. We also look at any security tools (such as password protection for specific documents) provided to grant users and groups access to databases.

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CIRCLE 254 ON READER SERVICE CARD

Search and Sort Your Web

By Todd Spangler

You've set up an intranet with thousands of documents. Though surfing the World Wide Web can be an entertaining diversion for 12-year-olds, business users will get frustrated if they can't find what they're seeking. Search engines that work with Web servers let users quickly retrieve the information they want.

There are two basic ways to let Web clients search and retrieve data. One method is to provide a translation layer between an existing database and a Web server (see "Query the Web"). The other is to install a search engine that is designed to work with a Web server—either on the Internet or an intranet—and should not be confused with Lycos, WebCrawler, Yahoo!, or other Internet search sites (although Lycos plans to release a commercial version of its search engine later this year).

UNDER THE HOOD

Many search engines run as Common Gateway Interface (CGI) scripts.

Every commercially available Web server is CGI-compliant, including those from Frontier Technologies, Netscape, O'Reilly & Associates, and Process Software Corp. (See "Setting Up Shop" for a chart of Web-server software and features.)

Several vendors—primarily Microsoft and Netscape—are also developing proprietary Web server APIs (application programming interfaces) to execute back-end applications more efficiently than CGI-based programs. The Netscape Server API (NSAPI) and Microsoft's Internet Server API (ISAPI) let add-on applications execute as extensions of the Web-server software itself—for example, as a dynamic-link library (DLL)—enabling tighter integration and better performance.

Some Web servers even include an integrated search engine, or are sold bundled with a search engine. Frontier Technologies and Quarterdeck both license Verity's Topic search engine as part of their Web servers. (The Topic search engine is also integrated into

Lotus Notes Release 4 and will be part of Microsoft Exchange Server.) Open-Text's Livelink Search system (\$12,500 and up) includes Netscape Commerce Server and Open-Text 5—the search engine behind the Yahoo! Web-wide search site.

The search engine you choose will depend largely on the platform of your network infrastructure and the type of data you want to search. Some sophisticated, higher-end tools—including Open Text 5, Verity's Topic Internet Server, and ZyIndex for Internet—can search multiple documents formats and rank results by relevancy. These products also include *spiders* (which automate document indexing) and can perform complex Boolean and concept-based searches. Some engines include preformatted forms to set up on your Web server and can translate proprietary formats into HTML on the fly. By contrast, freeware engines, such as CUI's htgrep, are sometimes little more than enhanced Unix search utilities.

Company/organization	Product name	Price	Platform	Document formats supported	Web address	Phone
Architext Software Inc.	Excite for Web Servers	Free	Unix, Windows NT	ASCII text, HTML	http://www.excite.com/navigate	415-934-3611
EMWAC (European Microsoft Windows NT Academic Centre)	WAIS Server and WAIS Toolkit	Free	Windows NT	ASCII text, HTML	http://emwac.ed.ac.uk	None
Fulcrum Technologies Inc.	Fulcrum Surfboard	\$6,250 and up	Unix, Windows NT	52 file formats including ASCII text, HTML, Microsoft Excel and Word, WordPerfect	http://www.fulcrum.com	800-385-2786
InTEXT Systems Inc.	InTEXT Retrieval Engine	\$7,500	Unix, Windows NT	40 file formats including ASCII text, HTML, Microsoft Word, WordPerfect	http://www.intext.com	800-547-8288
Open Text Corp.	Livelink Search*	\$12,500 and up	Unix, Windows NT	40 file formats including Adobe Acrobat, ASCII text, HTML, Microsoft Excel and Word, SGML, WordPerfect	http://www.opentext.com	800-507-5777
Pacific Coast Software	WebCatalog	\$995	Windows NT	Tab-delimited text	http://www.pacific-coast.com	619-675-1106
Personal Library Software	PLWeb	\$4,995	Unix, Windows NT	Adobe Acrobat, ASCII text, HTML	http://www.pls.com	301-990-1155
Tippecanoe Systems Inc.	Tecumseh	\$3,995 (60 users)	Windows NT	ASCII text, HTML	http://www.tippecanoe.com	510-416-8510
Venty Inc.	Topic Internet Server	\$7,995	Unix, Windows NT	50 file formats including Adobe Acrobat, ASCII text, HTML, Microsoft Excel and Word, WordPerfect	http://www.verity.com	415-960-7600
ZyLAB International Inc.	ZyIndex for Internet	\$5,995	Windows NT	20 file formats including ASCII text, HTML, Microsoft Word, WordPerfect	http://www.zylab.com	800-544-6339

*The product includes the Open Text 5 search engine and Netscape Commerce Server

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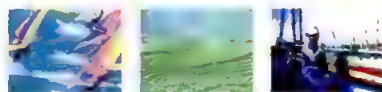
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Version L1G.2 and the Basis Webserver on a Sun SPARCstation 2 running Solaris 2.3. The Web server software, which can be used as a generic Web server with other applications, is a licensed version of CERN's HTTP server. A Netscape Commerce Server version of the Basis Webserver that supports the Netscape Server API (NSAPI) is expected to be ready by the time you read this. Installing the Basisplus database and Web server is not for Unix novices. The modifications necessary to the OS kernel will be confusing for the occasional Unix administrator.

WEB FRIENDLY

Accessing Basisplus information is far easier using the Web browser than with the product's Windows client. Besides using linked graphics and hot links for navigating through the database documents, the Basis Webserver lets users execute dynamic searches; the Windows client doesn't. If a new document has been added since the search was last run, WEBserver automatically includes it in the result set.

On the other hand, the proprietary client, Basis Desktop, is hardly obsolete, since it is the main interface for database development and content administration. Basis Desktop users can submit documents in one of more than 200 file formats and retrieve them in their original formatting. The Basis Desktop client also includes ODBC drivers to connect to other data sources, as well as an API development toolkit to enable other products to access Basisplus databases. While you can use the Web client to input ASCII text, you cannot use it to import documents or graphics, nor can you retrieve documents with a Web browser in anything but HTML.

Since Basisplus documents are in a variety of formats, the company developed Markup and Style Guides to enable different types of clients to view them. Like DynaText's style sheets, Basisplus Style Guides convert documents on the fly into several other formats, including HTML.

SUMMARY OF FEATURES

Document Databases

PC MAGAZINE
EDITOR'S CHOICE

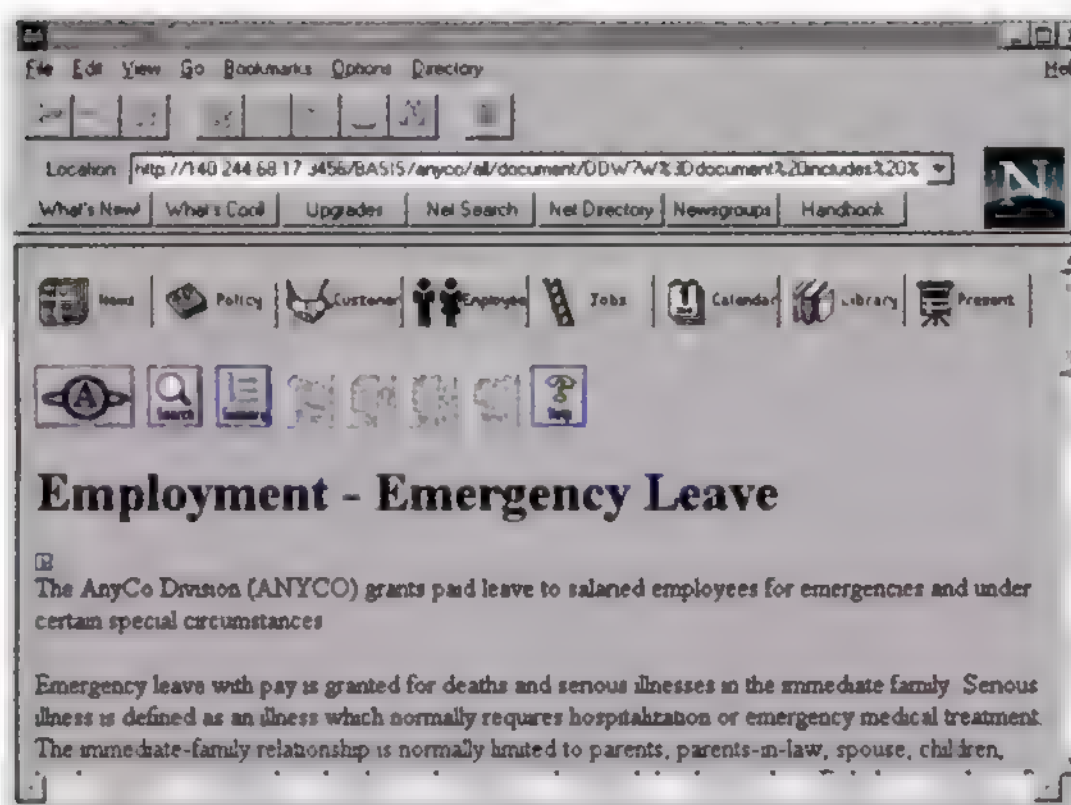
	Basis Document Manager	DynaWeb 1.0	Folio InfoBase Web Server	Lotus InterNotes Web Publisher
Products listed in alphabetical order				
List price	\$25,000	\$22,500	\$6,995	\$3,647
Server Requirements				
Does not require a dedicated server	■	■	■	■
Required RAM/hard disk space	32MB, 200MB	2MB, 8MB	16MB, 10MB	48MB, 300MB
Includes Web-server software	■	■	■	■
Works with third-party Web servers	■	■	■	■
Server NOS Support				
NetWare 3.12, 4.1	■ ■	■ ■	■ ■	■ ■
Windows 95	■	■	■	■
Windows NT Server 3.51	■	■	■	■
Windows for Workgroups 3.11	■	■	■	■
Macintosh System 7.x	■	■	■	■
Sun Solaris 2.5/Sun OS 4.13	■ ■	■ ■	■ ■	■ ■
SCO OpenServer	■	■	■	■
OS/2 LAN Server, Digital Pathworks	■ ■	■ ■	■ ■	■ ■
Runs over TCP/IP, IPX	■ ■	■ ■	■ ■	■ ■
File Formats Imported				
ASCII	■	■	■	■
Lotus 1-2-3 versions	Through 4.0	Through 2.0	None	Through 5.0
Microsoft Excel versions	Through 5.0	Through 4.0	2.1, 3.0, 4.0	Through 4.0
Microsoft Word for Windows versions	Through 6.0	Through 6.0	Through 6.0	Through 6.0
WordPerfect versions	Through 6.0	Through 5.0	5.x, 6.x	Through 6.1
.AVI/.WAV	■ ■	■ ■	■ ■	■ ■
FTP/NNTP	■ ■	■ ■	■ ■	■ ■
HTML/SGML	■ ■	■ ■	■ ■	■ ■
.PCX/.BMP	■ ■	■ ■	■ ■	■ ■
.RTF/JPEG	■ ■	■ ■	■ ■	■ ■
Web Browser Support				
Microsoft Internet Explorer	■	■	■	■
NCSA Mosaic/Netscape Navigator	■ ■	■ ■	■ ■	■ ■
Vendor provides browser	■	■	■	■
Web browser has live access to all databases	■	■	■	■
HTML conversion done on the fly	■	■	■	■
Proprietary client available	■	■	■	■
HTML-translated documents can contain:				
Text/Rich text	■ ■	■ ■	■ ■	■ ■
Structured data/Graphics	■ ■	■ ■	■ ■	■ ■
Sound/Video	■ ■	■ ■	■ ■	■ ■
OLE links/Hypertext links/Tabular data	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Web Browser Search Features				
Search by database/topic/full text	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Proximity/Boolean/nested search	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Table of contents generated on the fly	■	■	■	■
Search results using Web client can be sorted alphabetically/by database/by relevance	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Web Browser Editing and Navigation				
Add bookmarks/annotations/highlights	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
User can attach notes	■	■	■	■
Web-browser clients can navigate databases:				
By table of contents/index	■ ■	■ ■	■ ■	■ ■
Via PgUp/PgDn links	■ ■	■ ■	■ ■	■ ■
Management				
Manager can assign passwords	■	■	■	■
Manager can assign multiple levels of access rights	■	■	■	■
Manager/user can customize Web-page interface	■ ■	■ ■	■ ■	■ ■

*This product supports Sun Solaris 2.4.

SUITABILITY TO TASK

Basis Document Manager

	Power	Ease
Installation and configuration	Good	Fair
Database accessibility	Good	Good
Customization	Good	Fair



Basisplus gives Web browser users navigational buttons not available to users of the proprietary Basisplus client.

But creating the Style Guide for HTML conversion is an extra step that is not necessary with Folio Infobase Web Server and Lotus InterNotes Web Publisher.

Basis WEBserver is most useful if your company already uses Basisplus databases. System setup, database development, and maintenance take some Unix expertise. Unix sites will find the product appealing because the database server and Web server can reside on the same machine. Non-Unix shops will want to wait for the Windows NT versions of Basisplus and Basis WEBserver to consider this product.

Basis Document Manager. List price: \$25,000 (includes Basisplus, Basis WEBserver, Netscape Commerce Server, and 10-user license). Information Dimensions Inc., Dublin, OH; 800-328-2648, 614-761-7323; <http://www.idi.oclc.org>. *Circle 445 on reader service card.*

Electronic Book Technologies Inc.

DynaWeb

The DynaText electronic publishing platform, from Electronic Book Technologies, is building on its support for SGML to bring its databases to Web users via DynaWeb. DynaText offers powerful tools for turning just about any combination of existing documents into standardized DynaText "books." But like the other publishing platform reviewed here, the Folio Infobase Web Server, DynaWeb (sold with DynaText, which starts at \$22,500) only lets corpo-

rate Web users view documents, not enter information. If you want to give users the ability to add information to the database, you'll have to give them the proprietary Windows client. And the DynaText system runs on Unix, so having at least some Unix experience is a prerequisite.

Like Folio Views, DynaText is a popular database used by publishers and CD database developers to distribute information. Its proprietary client, DynaTag, lets you automatically convert existing document formats such as Microsoft Word into DynaText's native format, Standard Generalized Markup Language (SGML). But while DynaTag is very powerful, the DynaText system provides no native authoring tools that you can use to create SGML content from scratch.

DynaWeb runs on a Unix system; we tested it on a Sun SPARCstation 2 running Solaris 2.4. The menu-driven installation was pretty straightforward, but getting databases up and running was another matter. Like Folio Infobase Web Server, DynaWeb is a single-purpose Web server used solely to convert DynaWeb documents to HTML.

UNIX WORLD

DynaWeb's configuration must be done directly in Unix. To make a database available to Web users, from the Unix server you add DynaText books to a book list, which adds them to the Web server's home page as hot links. If you have converted

documents into SGML from a Windows-based PC, then in order to make them available to the DynaWeb server, you must either map the Unix server to a PC file server or copy files between the PC and the Unix server using an FTP or UUCP (Unix-to-Unix Copy Program).

The proprietary DynaText client has a split-screen interface with a table of contents on the left and the DynaText document pages on the right. While the company plans to incorporate Netscape's frames HTML extension into DynaWeb, the current Web interface does not include the split screen. So at least right now, it is more difficult to use than its Windows counterpart. DynaWeb has added a toolbar at the top of each Web page, but navigation is much more intuitive with the proprietary Windows client. Similarly, while you can add documents to the database using the DynaText client, you can't add content directly from a Web browser.

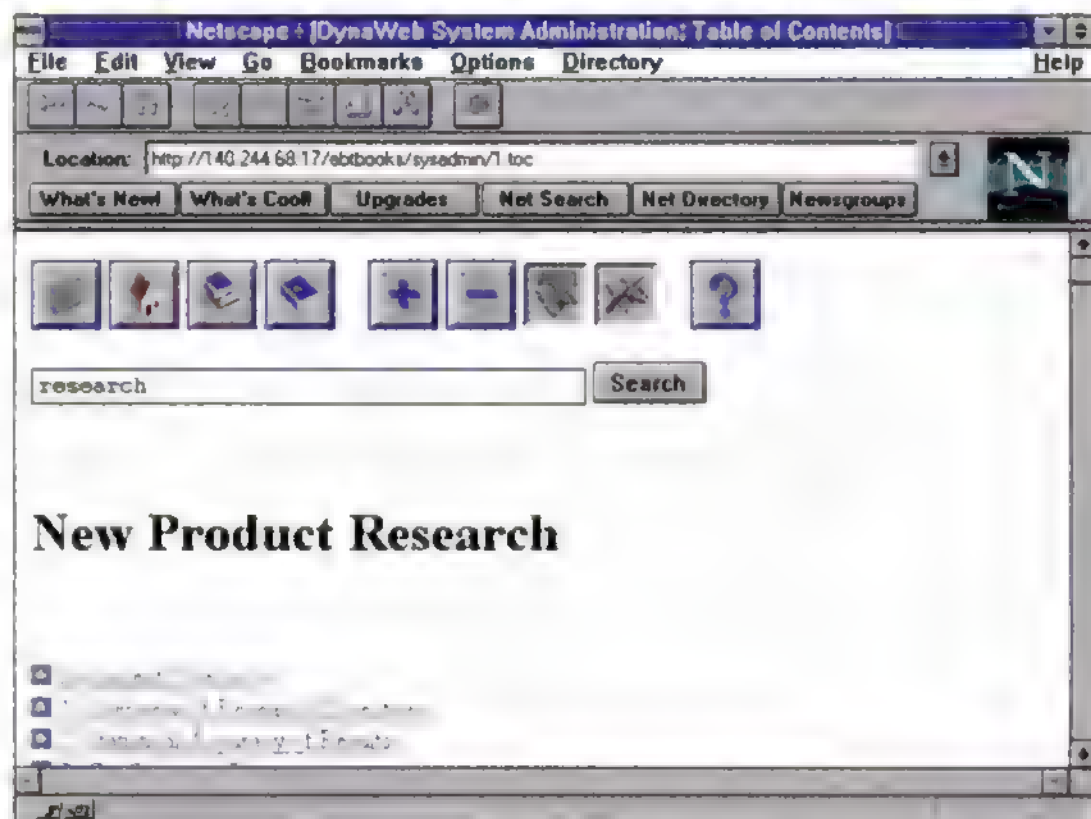
Like the other products reviewed, DynaWeb lets Web-browser users perform full-text searches. By default, the search option appears on the first page of the book along with the Web version of the table of contents.

SUITABILITY TO TASK		
DynaWeb		
	Power	Ease
Installation and configuration	Good	Fair
Database accessibility	Good	Good
Customization	Good	Fair

documents into SGML from a Windows-based PC, then in order to make them available to the DynaWeb server, you must either map the Unix server to a PC file server or copy files between the PC and the Unix server using an FTP or UUCP (Unix-to-Unix Copy Program).

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Like the other products reviewed, DynaWeb lets Web-browser users perform full-text searches. By default, the search option appears on the first page of the book along with the Web version of the table of contents.



DynaWeb converts content into HTML on the fly, but unlike Basis Document Manager and InterNotes, it doesn't let Web clients add content.

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Creating on-the-fly Web conversion is a natural extension for the DynaText architecture. DynaText uses a format-conversion tool called InStEd, similar to the Basis Document Manager's Style Guides, which converts a document's text and graphics into formats for different viewers. To enable HTML translation, however, you have to create a style sheet for that specific purpose first, a time-consuming task that is unnecessary with Lotus InterNotes Web Publisher or Folio Infobase Web Server.

DynaWeb and DynaText are designed for the serious electronic publisher. But because DynaText and DynaWeb run on Unix, PC-centric shops might feel less comfortable with the system's architecture. **DynaWeb 1.0.** List price: \$22,500 (includes DynaText 2.3c). Electronic Book Technologies, Providence, RI; 401-421-9550; <http://www.ebt.com>. Circle 446 on reader service card.

Folio Corp.

Folio Infobase Web Server



Folio Corp. has paired its database publishing system with the Folio Infobase Web Server 1.0 (\$6,995) to let Web-browser users view Folio's hypertext, flat-file databases. The easiest product to set up, Infobase

Web Server automatically and reliably converts documents into HTML without any manual style-sheet coding. But like DynaWeb, Web clients can't enter data into Folio databases, making the Infobase Web Server suitable only for electronic publishing.

Folio Views (\$895) is best known for publishing third-party documentation and databases on CDs. Folio typically licenses its search and retrieval technology to companies that use Folio Views to create and distribute documentation. The Infobase Web Server expands Folio Views' scope by converting selected databases to HTML on the fly, giving Web browsers much of the same rich-text and graphical-content functionality as proprietary Folio Views-client users.

We tested the Infobase Web Server with Folio Views 3.1a IPK (Infobase Production Kit), which provides proprietary

DOS, Windows, and Macintosh clients for viewing and developing Folio Views databases. In addition to tools for infobase creation, development, and maintenance, the IPK clients include filters for importing databases, such as Lotus Notes databases, into a Folio Views infobase.

The Infobase Web Server, which runs under Windows NT Server 3.51, is a single-purpose server used solely for HTML conversion; you cannot use it as a generic Web server. Infobase Web Server works with any database in Views Infobase 3.1 format or above.

Folio Views infobases are designed to be as free-form as possible: They don't have fields like a Notes database; instead they have a variety of distinct hyperlinks for navigating through the database. In testing, we found that many of the links converted perfectly into HTML page links.

READ ONLY

Setting up the Infobase Web Server and databases couldn't be much easier. The Web Publisher Data Source Manager lets you select databases you want to make available through the Web Publisher, and it lets you assign attributes (such as database title and location). Once the Web Server is activated, users accessing the Web site will see the list of available databases on the opening home page. While the administrator can make some basic modifications to the default home-page format, Infobase Web Server does not provide HTML editing tools. When a Web-browser user requests information from



Folio's Infobase Web Server automatically includes basic navigation buttons on database documents.

the document database, the Web Publisher converts the query result to HTML automatically.

Infobase pages that get converted by the Web Server look reasonably close to the original text and graphics. Hot links, converted from Folio's hyperlinks, allow you to move among HTML pages as you would in Folio Views. But unlike the Folio Views clients, the Web-browser client cannot enter data into a Folio database (as can those of Basis Document Manager or InterNotes Web Publisher).

The pages look good, but, as with most products here, a great deal of the navigational aids of the proprietary client software don't translate well into the browser. The proprietary Folio Views client has a myriad of navigation aids for moving within an infobase and for jumping between search results, whereas the Web client only has the links between documents.

The all-important search capabilities of a database are all available to the Web client. With a Web browser you can use Boolean operators and even nest searches to refine results. But here again the Web client has limitations. Folio's proprietary Views client gives you a sharp, hierarchical map that immediately tells you how many hits will result from a given search. The search map under the browser provides less information.

The Folio Infobase Web Server can't be beat for its quick installation, especially for sites just starting electronic publishing. It comes with its own built-in Web server

SUITABILITY TO TASK

Folio Infobase Web Server

	Power	Ease
Installation and configuration	Excellent	Excellent
Database accessibility	Good	Excellent
Customization	Fair	Good

designed to work with Views Infobases. And reliable conversion offsets the product's lack of HTML-specific formatting tools. Of course, for sites already using a variety of Folio formatted databases, this is a natural and logical extension tool as you move your Folio Views infobases into your intranet or onto the Internet.

Folio Infobase Web Server 1.0. List price: \$6,995; Folio Views, \$895. Folio Corp., Provo, UT; 800-543-6546, 801-229-6700; <http://www.folio.com>. *Circle 447 on reader service card.*

Lotus Development Corp.

InterNotes Web Publisher

InterNotes Web Publisher, from Lotus Development Corp., gives Notes sites a quick way to convert existing Notes databases and applications into Web pages. The Web Publisher lets companies distribute Notes database text, graphics, and even embedded objects to Web-browser users and collect simple feedback from them. But unlike the other products we reviewed, the product currently requires a separate third-party Web server. Furthermore, because Web Publisher doesn't translate documents on the fly, you must maintain a separate document store for the translated HTML documents.

Web Publisher is an add-in server process that runs on Notes servers running Windows NT Server 3.51 or OS/2 Warp. We looked at InterNotes Web Publisher Release 2, which is sold for \$3,647 for Lotus Notes 3.3 or higher. By mid-year, Lotus expects to offer a newer version of the Web Publisher free in versions of Notes Release 4 (\$495 per server for the single-processor version). And current users of Release 4 will be able to download the new version of Web Publisher—in beta at press time—free from Lotus's Web site.

The basic function of Web Publisher is to convert Notes databases and documents into HTML 2.0 pages. It also allows Web-browser clients to perform full-text searches of Notes databases and enter data directly into a Notes database using HTML forms. Unique among the products here, the Web Publisher doesn't give Web users real-time access but rather converts documents at configurable inter-

vals in batch mode. For example, you can set Web Publisher to translate a database into HTML anywhere from every second to every day.

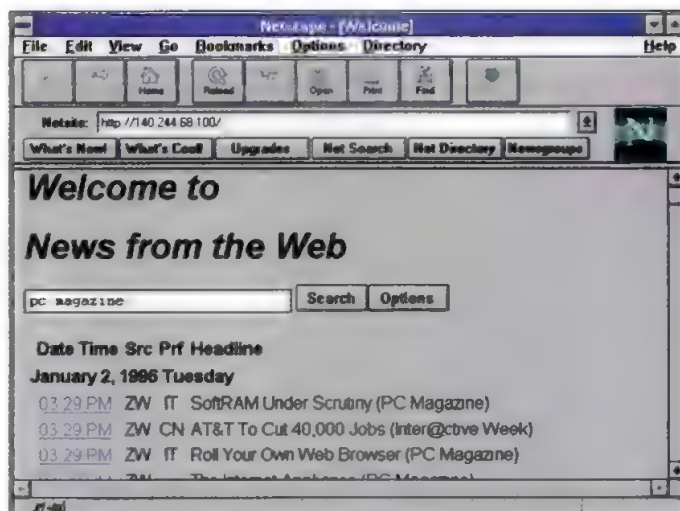
Web Publisher requires a third-party Web server; a future release of Notes is expected to have a built-in HTTP server. Setting up the product is pretty intuitive, especially if you're already a Notes administrator. Web Publisher adds a configuration database to your Notes server that lets you specify which databases to publish to your Web server and how often.

FORMAL AFFAIR

New to Web Publisher Version 2.0 is support for HTML forms, which lets Web users add documents directly to Notes databases. The administrator creates the forms in Notes and they are translated into HTML. Web Publisher implements forms using a common gateway interface (CGI) application. The Notes server and Web server must reside on the same physical machine for forms support to work.

But HTML forms are still limited compared with Notes Release 4 forms. For example, while you can create several buttons for standard Notes applications, Web Publisher cannot translate any button functionality. You are limited to just one button, which must be used as the Submit button, per Web application. So while you can create simple applications for searching databases, entering data, or participating in discussions, you will have difficulty implementing more complicated applications such as Web-based workflow.

Other Notes features don't make it to



InterNotes Web Publisher lets Web-browser users add data directly to Notes databases.

the common ground of the Web: Notes security, such as access control lists (ACLs), do not translate through Web Publisher. You'll have to implement security through your Web server.

Web Publisher fairly accurately translates standard Notes documents and forms, but without support for linked graphics the resulting HTML pages are a little crude. For greater flexibility in the appearance of your Web pages and the default home page, Notes and the Web Publisher permit you to enhance pages by adding HTML manually.

Web Publisher converts Notes Views too. The default Notes view, a summary listing of database documents, gets converted into a list of hot links to the full documents. The Web Publisher also converts Notes' proprietary DocLinks into HTML links.

We liked the ease of use and flexible features offered by Web Publisher, despite its occasional limitations in translating Notes documents and forms into HTML. While you wouldn't want to use InterNotes Web Publisher as your Web publishing platform, it's a basic extension for converting existing Notes data and forms into HTML.□

InterNotes Web Publisher 2.0. List price: \$3,647; included in Lotus Notes Release 4, \$495 per server (single-processor version). Lotus Development Corp., Cambridge, MA; 800-346-1305; 617-577-8500; <http://www.internotes.lotus.com>. *Circle 448 on reader service card.*

SUITABILITY TO TASK		
Lotus InterNotes Web Publisher		
	Power	Ease
Installation and configuration	Good	Excellent
Database accessibility	Good	Good
Customization	Good	Good



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As you can see, the more things change, the more they stay the same.



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INTRANET HOW-TO

Setting Up Shop

Intranets are working today. Not only are they a great way to provide access to corporate information and collaboration, but organizations are finding them easy to install. Add the fact that they are cost-effective and scale well and you have to ask yourself, why wait?

The Internet has grown strong on the basis of a couple of principles. One is that it enables the building of software from off-the-shelf components. Another is adherence to open standards. Both of these principles owe much to the fact that the Internet is based in Unix.

If you already have a corporate investment in Unix, your best bet is to build your intranet on a Unix platform. If not, don't worry; you don't have to learn Unix to set up and run an intranet. As the Internet has become enormously fashionable in recent years, software developers have focused on rapidly moving most of the Internet tools from Unix platforms to the PC and the Macintosh. As a result, today almost anything you can do on the Internet, you can do from a PC, and virtually any application you can set up on the Internet, you can set up on a PC.

THE WEB IS THE CENTER

Early intranet growth has been fueled not by the applications that originally grew the Internet, such as e-mail and FTP, but by the one technology that is grabbing all the headlines today: the World Wide Web.

The Web is a great way to share information. It is fun and easy to use, and a local Web costs very little to create. For example, if you are running Windows NT 3.51, all you have to do to set up an HTTP server that will dish out Web pages is download the Microsoft Internet Information Server from Microsoft's Web site and follow the instructions in the installation wizard.

Would Internet e-mail and newsgroups also be useful to a corporate intranet? Not really, at least for now. While there are some good POP3/SMTP e-mail servers for Windows NT, most don't offer any advantage over your current e-mail system, assuming you have one. And while NNTP (network news transfer

It doesn't take a major investment of time or money to get an internal Web site up and running.

By Rick Ayre

protocol)—the technology that drives newsgroups—is also available with enough power for intranet collaboration, it is difficult to set up and use. It also offers no significant advantage over commercial group discussion products. But don't dismiss NNTP and POP3 yet; we may well turn a corner and see them staring back at us.





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SENS 800

PENTIUM® PROCESSOR	75 MHZ	75 MHZ	90 MHZ
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CIRCLE 033 ON READER SERVICE CARD

STEP 1: GET TCP/IP

The TCP/IP protocol is the absolute center of the Internet, and it must be at the center of your intranet. It doesn't need to be the only protocol, and in many cases companies run TCP/IP on top of NetWare's IPX (Internet Packet Exchange), but most intranet applications need TCP/IP.

You have two choices. If your clients are running OS/2, Windows for Workgroups, Windows 95, or Windows NT Workstation, you can run the TCP/IP stack software available with those operating systems. If you're running NetWare for file and print services and many of your clients are still running Windows 3.1 or DOS on low-powered systems, you may want to consider an IPX-to-IP gateway between your Web server and the rest of your network.

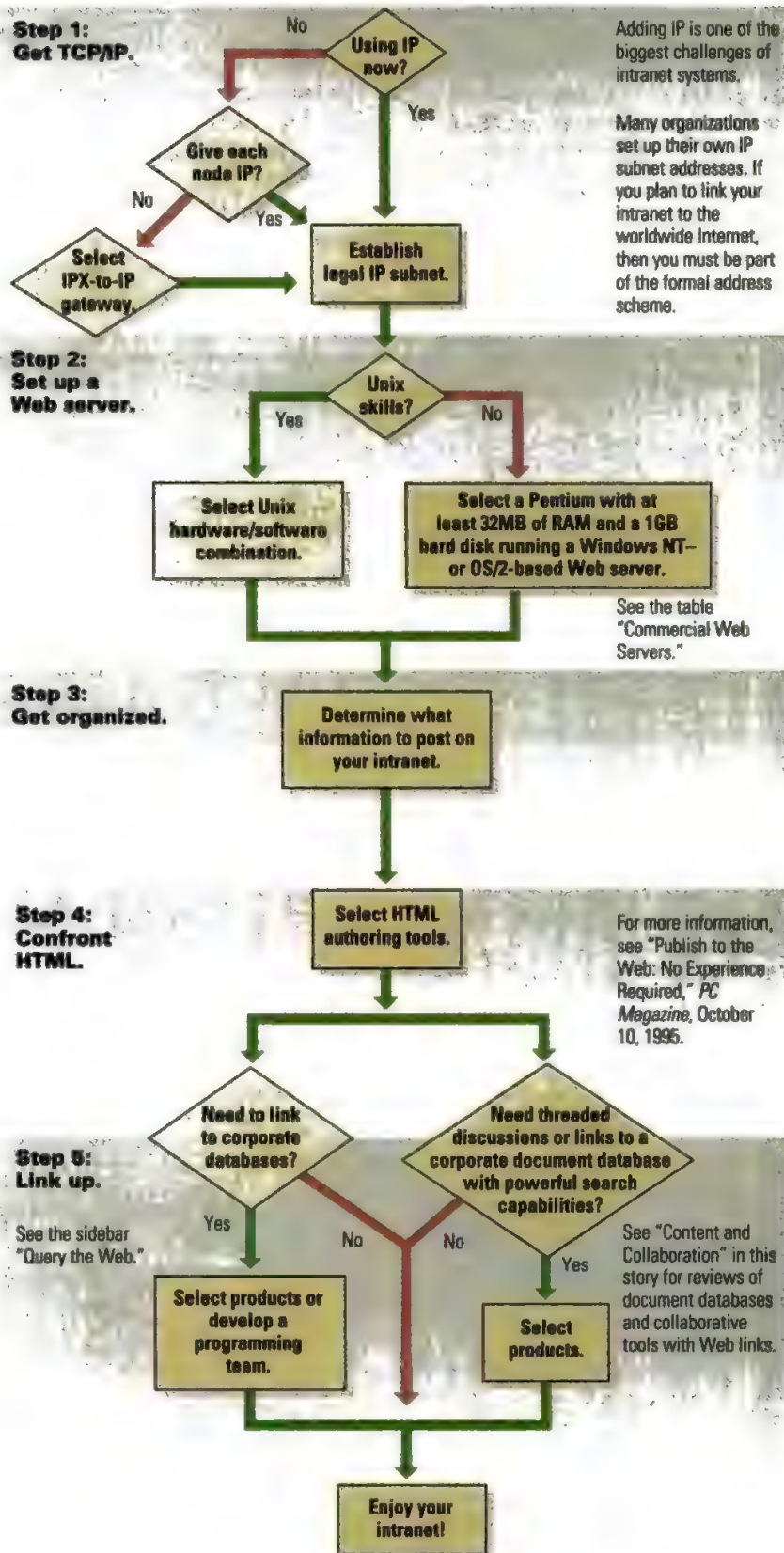
STEP 2: SET UP A WEB SERVER

Next you need to acquire a Web server, the one essential piece of intranet software. Free and shareware HTTP servers typically offer all you need to get an intranet up and running. Midrange commercial servers add tools for monitoring and maintaining your Web site. And to that, the best Web servers add security, encryption, and even links to corporate databases.

Of course, the size of your intranet is important. By size, though, we mean how many simultaneous connections you expect to your Web server, and how graphical the content you'll store on it. In truth though, since Web technology is so new, little definitive information on scaling is available. Most of the servers we mention below are capable of handling moderate traffic. In most cases where the traffic increases enough to slow server performance, adding hardware such as server system memory or a faster network connection, rather than upgrading your Web-server software, is the solution. Keep in mind that you'll probably want to start with at least a Pentium PC with 32MB of RAM and a 1GB hard disk.

The first popular Web servers were written at CERN and at the National Center for Supercomputing Applications (NCSA), the same group that developed the Mosaic browser. Both Web servers are generally distributed as source code for Unix platforms, but there is documentation for compiling the CERN server to run

Five Steps to Building an Intranet



under Windows NT. Both are well documented on the Web (see "Useful URLs").

Microsoft makes its new Internet Information Server available free to owners of Windows NT 3.51 and includes it as part of Windows NT 4.0. Midrange Web servers include WebSite (\$499) from O'Reilly & Associates and the new Spry Web Server (\$495) for Windows NT. Spry also sells the Spry SafetyWEB server, which adds Architext's search engine, built-in SQL database connectivity, complete access control, and multiple virtual-server support.

Netscape servers come in a variety of flavors. For Windows NT, prices range from \$495 for Netscape Communications Server to \$1,295 for Netscape Commerce Server. Prices for Unix systems are higher. The Communications Server is the company's entry-level software, but it comes with powerful graphical administrative tools and proved an excellent performer. The Commerce Server adds support for secure transactions, which is a must for those doing business on the Internet and may be important to those starting an intranet.

Secure transactions allow encrypted

communications between clients and servers. In most intranet applications such security is not necessary, but some in-house applications (Human Resources, for example) may call for it.

Web server-access control comes in a couple of flavors. Typically only some people will have the ability to create pages for your Web server. That kind of control is usually handled the way you already handle assigning reading/writing rights to network users. Then there are two ways to control user access, or their ability to read Web pages. There is what is called IP or host-name filtering, through which certain IP addresses are allowed access to certain pages on your Web server. There is also user verification, or password-controlled access to Web pages. All of the commercial servers we discuss support both IP filtering and user verification.

STEP 3: GET ORGANIZED

If you haven't already done so, now is the time for your organization to determine what kind of information it wants to share on its intranet. This will no doubt involve

a process of meeting with departments, drawing up proposals, and getting approvals. One of the most important and most difficult things to determine up front is the content layout and navigational aspects of the intranet.

For design purposes, determine the structure of the information you're going to serve up: linear, hierarchical, or perhaps more gridlike or interrelated. If, for example, you want to create a simple step-by-step tutorial, then you would likely have a simple linear layout. Each page links to the one before it and the one after it. This is the simplest kind of Web design.

Hierarchical applications, such as a table of contents, are more difficult to create. You should diagram your links before you attempt to code them in HTML. A gridlike application—one in which a page links to many pages and each new page contains many links—is the most difficult to design well. It takes a lot of forethought—unless you plan to link Web users to a proprietary document database.

Sometimes when designing complicat-



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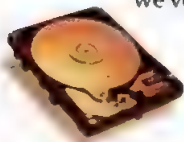
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Model	Capacity	Interface	Transfer Rate	Seek	Rotational Speed
Medalist 1640	1.62 GB	Fast ATA-2	16.6MB/s	10 ms	5,400RPM
Medalist 2140	2.11 GB	Fast ATA-2	16.6MB/s	10 ms	5,400RPM

 **Seagate**
THE DATA TECHNOLOGY COMPANY

ed applications, it helps to have a print model in mind. For example, perhaps you want your application to be like a catalog, or maybe a magazine or reference book. Each application would have a different design, but the print equivalents can be used to guide you in your efforts.

STEP 4: CONFRONT HTML

Now you must prepare the actual content to be posted on the Web. That means coding in HTML or using some of the automated tools for preparing HTML documents. You have a few choices. You can create HTML documents from scratch; you can translate documents to HTML; you can use an integrated management system such as NaviPress or Microsoft FrontPage; or you can use an existing document database that provides automated on-the-fly HTML translation for Web users.

If you choose the first three options, you'll need to know some HTML syntax. Some of the best resources for a crash course in HTML are free on the Web (see "Useful URLs," and for a review of HTML authoring tools, see "No Experi-

Useful URLs

Site	Web address
Web server resources	
Yahoo! 's list of Web server information resources	http://www.yahoo.com/Computers_and_Internet/Internet/World_Wide_Web/HTTP
Yahoo! 's list of Web server software	http://www.yahoo.com/Computers_and_Internet/Internet/World_Wide_Web/HTTP/Servers
EMWAC 's free Web server for Windows NT	http://emwac.ed.ac.uk/html/internet_toolchest/htps/contents.htm
Microsoft 's free Internet Information Server for Windows NT	http://www.microsoft.com/infoserv
NCSA HTTP server information	http://hoohoo.ncsa.uiuc.edu/docs/Overview.html
CERN HTTP server information	http://www.w3.org/hypertext/WWW/Daemon/Status.html
Web developer 's Virtual Library list of servers	http://WWW.Stars.com/Vlib/Providers/Servers.html
Feature comparison of Web servers	http://www.proper.com/www/servers-chart.html
HTML authoring resources	
Yahoo! 's list of HTML guides and tutorials	http://www.yahoo.com/Computers_and_Internet/Software/Data_Formats/HTML/Guides_and_Tutorials
InfoAccess 's HTML Transit	http://www.infoaccess.com/products/transit/httos.htm
Sausage Software 's HotDog Web Editor	http://www.sausage.com/dogindex.htm
SoftQuad 's HotMeTaL PRO 2.0	http://www.sq.com/products/hotmeta/hmp-org.htm
Intranet resources	
BES/Internet Services' Intranet Journal—information and discussion group on intranets	http://www.brill.com/intranet
Zona Research 's intranet report highlights	http://www.zonaresearch.com/Pubs/inet.html
Netscape Communication Corp. 's intranet white paper and customer profiles	http://home.netscape.com/comprod/at_work/index.html
Process Software Corp. 's intranet white paper	http://www.process.com/news/intrawp.htm
PC Magazine 's InternetUser—news and reviews of Internet software	http://www.zdnet.com/pcmag/IU/user.htm

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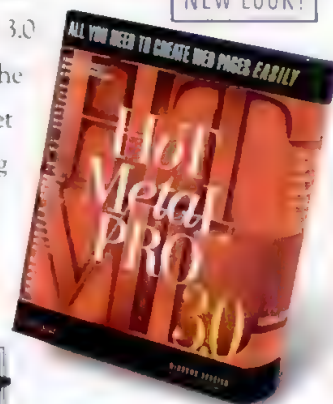
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Want to know more? Go to <http://www.vmedia.com/htmlpro8.html> for details, system requirements and specials.

CIRCLE 346 ON READER SERVICE CARD

Commercial Web Servers

The information in this chart is current at press time, but Internet software can change daily. Check the vendors' Web sites for the latest information.

Company	Product name	List price	Web address	Telephone	Encryption	Database connectivity	Search engine included	HTML tools included
Windows NT Server 3.51								
CompuServe Internet Division	Spry SafetyWEB Server	\$1,295	http://server.spry.com	800-557-9614	SSL	ODBC	Architext's Excite	HoTMetal Pro
CompuServe Internet Division	Spry Web Server	\$495	http://server.spry.com	800-557-9614	None	ODBC	None	None
Frontier Technologies Corp.	SuperWeb Server	\$795	http://www.frontiertech.com	800-929-3054	None	None	Verity's Topic	WebDesigner
The Internet Factory Inc.	Commerce Builder	\$995	http://www.aristosoft.com/ifact/inet.htm	510-426-7763	SSL	ODBC	None	None
The Internet Factory Inc.	Communications Builder	\$495	http://www.aristosoft.com/ifact/inet.htm	510-426-7763	None	ODBC	None	None
Microsoft Corp.	Microsoft Internet Information Server	Free	http://www.microsoft.com/infoserv	800-426-9400	SSL	Internet Database Connector, ISAPI	None	None
Netscape Communications Corp.	Netscape Commerce Server	\$1,295	http://home.netscape.com	800-638-7483	SSL	Netscape Server API	None	None
Netscape Communications Corp.	Netscape Communications Server	\$495	http://home.netscape.com	800-638-7483	None	Netscape Server API	None	None
O'Reilly & Associates Inc.	WebSite	\$499	http://website.ora.com	800-998-9938	None	CGI for Visual Basic 4.0	WebSite search engine	HotDog Standard
Process Software Corp.	Purveyor WebServer for Windows NT	\$495	http://www.process.com	800-722-7770	SSL	ISAPI, ODBC	Verity's Topic	HoTMetal (shareware)
Quarterdeck Corp.	WebStar 95/NT	\$395	http://www.quarterdeck.com	800-683-6696	None	None	None	None
Questar Microsystems Inc.	WebQuest	\$495	http://www.questar.com	800-925-2140	None	ODBC	None	WebEdit (shareware)
NetWare 3.x and 4.x								
American Internet Corp.	SiteBuilder ^{1,2}	\$1,495	http://www.american.com	800-425-1112	None	None	None	None
GLACI Inc.	GLACI-HTTPD ¹	\$475	http://www.glaci.com	414-475-6388	None	None	None	None
GLACI Inc.	GLACI SecureServ ¹	\$2,995	http://www.glaci.com	414-475-6388	SSL	None	None	None
Novell Inc.	NetWare Web Server ¹	\$995	http://www.novell.com	800-638-9273	None	None	None	WordPerfect Internet Publisher
OS/2 Warp								
IBM Corp.	IBM Internet Connection Server for OS/2 Warp	\$799	http://www.ibm.com	800-426-3333	None	CICS, DB/2	None	None
IBM Corp.	IBM Internet Connection Secure Server for OS/2 Warp	\$2,999	http://www.ibm.com	800-426-3333	S-HTTP, SSL	CICS, DB/2	None	None

¹ This product requires the NetWare/IP NLM, which is included with NetWare 4.1.

² This product includes IPAccess, an IPX-to-IP gateway.

ence Required," October 10, 1995). As you learn HTML, you can choose your own weapon.

If you are creating your HTML documents from scratch, an editor is the best choice. HoTMetal Pro 2.0 (\$195) was a *PC Magazine* Editors' Choice and is a good place to start. You can download a light version that is free (see "Useful URLs"). HotDog Professional (\$99.95) is a new product, but an up-and-coming one. On HotDog's Web site, you'll find a demo free to try. These Windows editors are great aids in coding HTML documents and do a fair job of converting small documents from another source to HTML.

To convert a large volume of documents, though, you'll want an industrial-strength tool. Most of the conversion programs are new, so none have yet been involved in *PC Magazine* comparative reviews. A couple of products seem to have promise. One is HTMLTransit from InfoAccess; another is Cyberleaf

from Interleaf. Both are fairly expensive, but they can make the process of translating large quantities of information much easier.

The complete Web systems, such as NaviPress and FrontPage, are perfect if you are planning a Web site that will change a lot. These products allow you to track links, edit pages in place on your Web server, and automate other mundane procedures that Web masters face.

STEP 5: LINK UP

Finally, if you will be providing access to hundreds or thousands of documents that change constantly, consider linking your Web server to one of the document databases reviewed in "Content and Collaboration." These packages provide users with robust search, viewing, and document management capabilities. They also come with tools for the on-the-fly translation of documents to HTML. You may also want to provide browser access to your corporate database sys-

tems. The tools for creating these links are discussed in "Query the Web." Finally, for group discussions on your Web pages, see our reviews of four Web collaboration products, also in "Content and Collaboration."

There are any number of good solid Web browsers, and many of them are free. The best browser is Netscape Navigator, which is not free but must be licensed. But many of the reasons Netscape is better may not matter to intranet publishers. For example, if you don't need Java application support or other cutting-edge plug-in application support built into your browser, then you probably don't need Netscape and can save a bundle by going with a free browser. Of those that are free, Microsoft's Internet Explorer and NCSA Mosaic 2.0 (<http://www.ncsa.uiuc.edu>) are among the best. WebSurfer from Netmanage (<http://www.netmanage.com>) is also a good free browser, and it runs on all Windows platforms. □

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A **STARRY-EYED DREAMER**
named Stan Shih set out to
create a billion-dollar **GLOBAL**
COMPUTER COMPANY with
a donation from his **MOM**.



ACER presents the hard-to-believe Formative Years: 1976-1980

1976

With the aid of a maternal contribution and a total of \$25,000, Stan Shih founds Acer® as Multitech International and begins his dream for a microprocessing enterprise.

Stout first brother upholds the dignity of his brother's Presidential status by licensing his name to a beer company.

1977

During an interview, Stan Shih tells prospective employee William Lu the company may go bankrupt. 18 years later, Lu is president of Acer Computer International, managing millions in global business.

Who could possibly play a thin-as-a-rail droid in the most successful science fiction film ever? The 90-pound British actor who was thin-as-a-rail enough to fit inside his armor.

1977

Acer America Corporation is established by Stan Shih for manufacturing, assembling, marketing, and selling microprocessor-driven technology throughout North America.

Charlie's Angels tops Nielsen ratings, proving that six-foot blondes with feathered hair are the archetypal detective heroes of the seventies.

1976

When everyone else sees typewriters as the core of productivity, Taiwanese entrepreneur Stan Shih envisions the microprocessor as the engine of business.

After keeping a low profile for 3,300 years in an Egyptian tomb, King Tut flaunts his wealth across America in an extravagant seven-city tour.

Prank-happy, beer-swilling fraternity failures reach celebrity status when National Lampoon's Animal House debuts on big screen.

Acer assumes leadership role as high-tech gurus by opening a microprocessing center and training 3,000 engineers for Taiwan's information industry.

1978

Human egg is fertilized outside female womb and world's first test tube baby is born. And you thought hospitals were sterile.

To promote computer literacy in Taiwan, Acer publishes Microprocessor Bulletin and establishes credibility in the field for microprocessing savvy.

1978

Multitech International begins incorporating microprocessors into electronic games and taps into rapidly growing consumer technology market.

1977

The King of Rock and Roll dies and is born again in cheesy Vegas lounges where desperate actors don the jumpsuit and sideburns to eke out a living.

Stan Shih's dignified business partner and wife Carolyn Yeh scrubs office floors and schleps around Taipei on a scooter distributing Acer bills.

1979

Headband-sporting tennis prima donna trademarks his million-dollar recipe for success with racket-throwing fits and prolonged swearing-at-the-umpire outbursts.

Acer introduces Chinese language CRT terminal and subsequently receives Taiwan's most prestigious design award.

1980

Millions show concern for a ruthless oil snake who destroys lives for pleasure when they tune in to watch the "Who Shot J.R." episode of Dallas.



Juggernaut Russian Ice Hockey team slips up to a bunch of college boys from the United States at the Lake Placid Winter Olympics.

Acer starts mass-producing microprocessor-driven computer components for local manufacturers and begins exporting CRT terminals in bulk.

1980

Who would have thought a company could be so far ahead of its time?

Yet even in the age of the information superhighway, Acer continues to pave the road.



To meet the demands of tomorrow, PC technology must be more advanced, accessible, and flexible than ever. That's why we deliver cutting-edge PC systems and components around the world. Acer always delivers the freshest technology—because all our global factories are located in key technology markets. Our research and development center in San Jose, California, has been setting the pace for years. They developed the first RISC-based PC, the first symmetric multiprocessing server, and the first 64-bit architecture for Windows NT.



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Since Acer components and systems are modular, you can always expand your capabilities while protecting your investment. Even quality is never an issue. We originally manufacture all our own hardware from the ground up. And every Acer factory has met the strictest ISO-9000 standards. Our forward-thinking philosophy has catapulted us into the top ten echelon of PC companies. Today we're a four billion-dollar business with a formidable presence in 37 countries. So we can actually afford to hire a janitor to scrub our office floors.

If all this is making you shake your head in disbelief, wait until you read our next installment, 1981-1985

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Too bad we can't
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While the slick seventies fashions have come and gone, two things will never go out of style. That's the AcerNote™ Pro and AcerNote Light notebooks. As modular portables, they give you the flexibility to change system hardware according to the task at hand. The AcerNote Pro features three modular bays that can house a CD-ROM drive, lithium ion batteries, a floppy drive, and a hard drive in several configurations. The AcerNote Light has a floppy drive module that swaps with a second lithium ion battery or a PCMCIA type III module in seconds. (And it weighs a paltry five pounds.) For multimedia presentations, network connectivity, faxing, additional power, and extra storage, AcerNote notebooks offer plenty of options. With the full-throttled power of a 75MHz or 120MHz Intel Pentium® processor or a Cyrix™ 5x86 processor, they're also robust enough for the most demanding applications. And both come preloaded with Windows® 95, the operating system of the future. So they'll never end up in the mothballs with all that lovely polyester.

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"Its bright, spacious screen
makes the most of Windows 95."

-Computer Shopper, 12/95



AcerNote Pro P75MHz

- 75MHz Intel Pentium Processor
- 8MB System RAM (Expandable to 40MB)
- 10.4" Dual-Scan LCD Displays 256 Colors
- 810MB Externally Removable 2.5" Hard Disk Drive
256KB L2 Cache
2 PCMCIA Type II/1 Type III Slot
Externally Removable 1.44MB Diskette Drive
- 14.4 Fax/Modem
- Secondary Lithium Ion Battery Option
1MB PCI Bus Video with Graphics Accelerator
- 2 NiMH batteries included
- 16-Bit Sound Blaster™ and Windows Sound Systems-
Compatible Stereo Audio Onboard with Built-In
Speaker and Microphone
- Slim 8.97" x 11.7" x 1.97" System Case Weighs 6.4 lbs.,
Including NiMH Battery
Personal Organizer and Hoyle® Classic Card Games
Included
- Microsoft® Windows 95
- Three-Year Limited Warranty with One-Year Next-
Business-Day Replacement in the U.S. and Canada

\$2,499

Business Leasing Available

AcerNote Pro P120MHz

- 120MHz Intel Pentium Processor
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Good-Bye, Rolodex! So Long, Sticky Notes!

A message to those of you who still haven't automated your contacts, schedules, and tasks: Get with the program. One of the 18 products we've evaluated is sure to help you make sense of your chaotic life, whether you work alone or in a group.

Ever since the first version of Sidekick arrived more than a decade ago, the advantages of using your PC to help you organize your life have been obvious. It's the perfect tool for remembering and managing things like names, addresses, schedules, and business contacts.

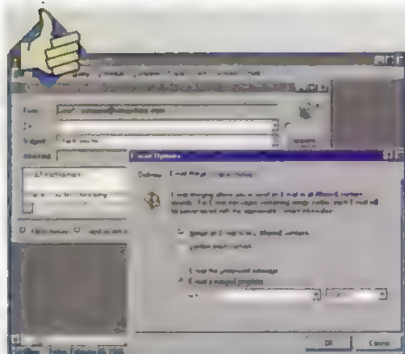
Over the years, the information-management market has fragmented into many sections: personal information managers (PIMs), for people trying to recreate the experience of using a paper day planner; contact managers, for people whose work is phone- and correspondence-centric; hybrids of the two; and free-form note-takers for people who just want to get some of the paper off their messy desktops.

Today, with ubiquitous LANs and e-mail, there's more overlap among all these categories than ever before (see the sidebar "The Evolution of Information Managers"). PIMs are group-enabled, contact managers can control your calendar, and most products let you share your calendar with an entire workgroup. For instance, a program like GoldMine, which used to be

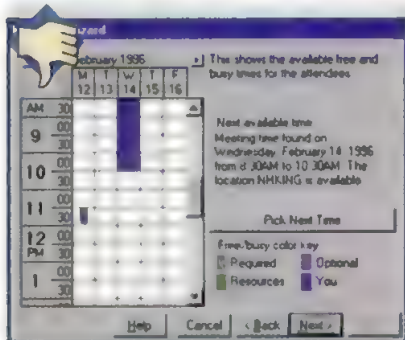
By Don Willmott



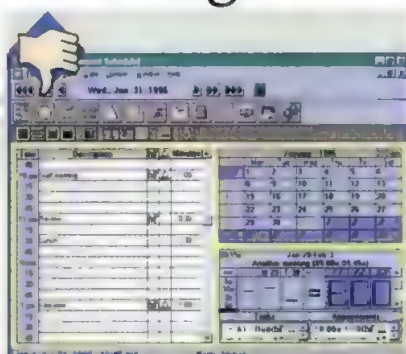
Information Manager Picks and Pans



Internet prowess, for some, topped the list of new features. GoldMine for Windows 95 features the ability to synchronize schedules and send contact management information over the Internet—which we expect will be the standard in the next generation of information managers.



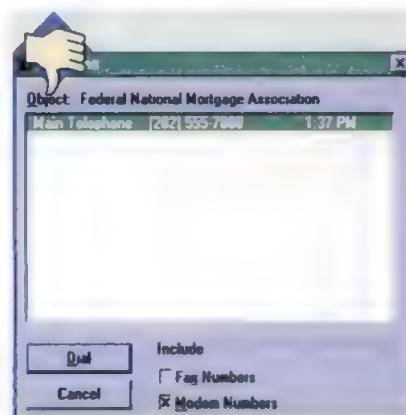
Just when you think schedulers have reached the limits of their abilities, some product comes along and surprises you. Schedule+ for Windows 95 distinguishes between essential attendees and those who are optional.



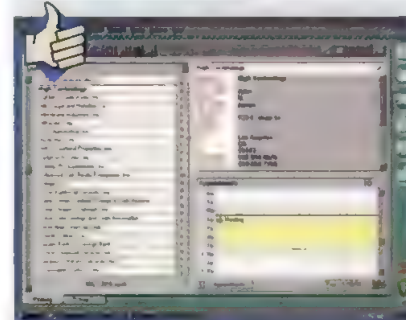
Scheduling abilities run the gamut from exemplary to somewhat underpowered. Scheduling is certainly not one of Ascend's top abilities. Most data is entered directly on the daily grid, and some calendar displays are difficult to read.



The more information you have, the more confusing it gets, right? Not necessarily. ECCO Pro manages to pack a lot of useful information on one screen without overwhelming you with a lot of clutter.



Crossing the line from information to contact management doesn't always work. InfoCentral misplaces the crucial timer option. You must manually activate InfoCentral's timer from the menu.



Your personal information manager should feel like a trusted friend. Sidekick 95 Deluxe conveniently manages personal information, contacts, and appointments in an attractive and intuitive interface.

a glorified database for contacts, has a full-featured PIM built in, not to mention extensive networking features and even Internet connections. Traditionally one of the best group-enabled contact managers, GoldMine ends up in the hands of stand-alone users half of the time. At the same time, PIMs are hardly personal anymore.

Even Ascend, tied closely to traditional paper-based diaries, is group-enabled.

We've evaluated 18 information managers that range from \$59 to \$395; we did not include applications that had not significantly upgraded since our last related review ("Sharing the Wealth," August 1995). We've focused our reviews on a

group of tasks that will help you find the one best suited for your particular work style. By studying each program's contact management, calendar and scheduling, task management, information management, workgroup, and remote features, you'll find one that can fit comfortably in your—or your workgroup's—daily routine.

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OBJECTIFICATION

Interestingly, several information managers have abandoned traditional database underpinnings for an object-based model. CrossTies, ECCO Pro, and InfoCentral all treat pieces of data as objects and then let you create elaborate interconnections and crosslinks. You can slice and dice information in all kinds of ways. Unfortunately, you must cope with a layer

of complexity to take full advantage of the concept, but the resulting power can be formidable. PIM historians will note that the concept started with Lotus Agenda, which broke this ground as early as 1987 but didn't succeed in the market.

Some of the more PIM-like products in this evaluation are definitely for single users only. Students, small businesspeople, and other users will love programs like Day Runner, InfoCentral, Info Select, and Sidekick. Even so, Sidekick will soon let you arrange workgroup schedules over the Internet. Group-enabling will become much more prevalent and full-featured as these products evolve.

Right now, the programs have widely varying support for workgroups. Six of the products we evaluated have no group-enabled features. Info Select can share files but doesn't allow simultaneous editing of files. Some let you share calendars. Action Plus lets you share contacts, but its security isn't ironclad. Day-Timer Organizer, ECCO, GoldMine, and Janna Contact make all data sharable. Fourteen of the programs share calendars, but not all can share address books. Lotus Organizer and Microsoft Schedule+, for example, don't have this feature. Thirteen of the programs have network versions, and nine let you assign tasks to others.

Organizations that use Lotus Notes have some intriguing options on the horizon. Symantec has previewed ACT! for Notes, an information manager that sits atop the Notes infrastructure, and Lotus itself has demonstrated Organizer-like scheduling features within Notes. And three of the information managers we looked at are tied to the big three office suites. Corel's (formerly Novell's) InfoCentral, Lotus Organizer, and Microsoft Schedule+ all integrate smoothly into their companion suites, with features like mail merge. Additionally, Janna Contact is a Microsoft Office-certified app that ties very closely to Office 95. Though it has more power than Schedule+, it proved very slow in testing.

Our Contributors: BILL DYSZEL, WAYNE KAWAMOTO, NELSON H. KING, and KATHY YAKAL are contributors to *PC Magazine*. DON WILLMOTT is an executive editor and YVONNE KOULOUTHROS is a staff editor of *PC Magazine*. LANCE N. ULANOFF was the senior associate editor in charge of this story, and BEN Z. GOTTESMAN, a technical director at *PC Magazine*, acted as project leader for this story.

Contact-centric:

GoldMine for Windows 95

Information-centric:

ECCO Pro

Our two Editors' Choices, GoldMine Software's GoldMine for Windows 95 and NetManage's ECCO

Pro 3.0, succeed in making our contact-centric and info-centric lives (respectively) a little easier to bear.

This is becoming a habit with GoldMine. For the second time in the past year (and the third time overall), GoldMine is a winner. The program has taken a headlong dive into Windows 95, implementing a fast, 32-bit engine. GoldMine excels at handling large, information-rich contact databases. It's also highly customizable, and the new tabbed dialog boxes and fields help to keep it from overwhelming users.

GoldMine Software has added the ability to manage Internet e-mail, link messages to contacts, and synchronize contact databases via the Internet. GoldMine also has effective calendaring and workgroup scheduling, and its Info Center is a strong first attempt at a free-form information management.

If your life revolves more around disparate information that must somehow be linked to your contacts, schedule, and other tasks, then our second

Editors' Choice, ECCO Pro, is the tool that could change your life. ECCO first gained notoriety with its unusual outline--based interface that worked for some but turned others off. NetManage has, in most cases, though, effectively hidden ECCO

Pro's complexity and made it a far more approachable product. ECCO has retained the outline metaphor, but has also added an intelligent contact- and schedule- management interface. What's more, ECCO's interface is highly customizable, letting you build your own data forms as necessary.

We've always appreciated ECCO's Shooters, the small arrow icons that let you easily move data between ECCO and other applications. The exciting new twist here is that you can now use Shooters in your favorite Web browser--the possibilities are limitless.

Another program we evaluated deserves mention: Lotus Development Corp.'s Organizer, for its attractive, planner-like interface that really works.



A WIDER WORLD

Nine of the programs in this roundup can synchronize their databases remotely by a variety of methods. That makes them really useful for people who travel and want to update schedules and contact information no matter where they go. The next logical step is to make good use of the Internet. Already, GoldMine has the ability to synchronize data files over the Internet, and it

features an excellent implementation of e-mail-merge that works just like traditional paper mail-merge. And ECCO, bought by NetManage last year, lets you use its "Shooters" to send Web addresses directly into its contact databases.

Ultimately, your work style will dictate your selection of an information manager. The software shouldn't make you change the way you work. Find the program that works the most like you do--and look for a program that can successfully import any data that you already have (no small task). Take those two steps, and you'll find yourself far along the road towards a more organized and productive way of working.

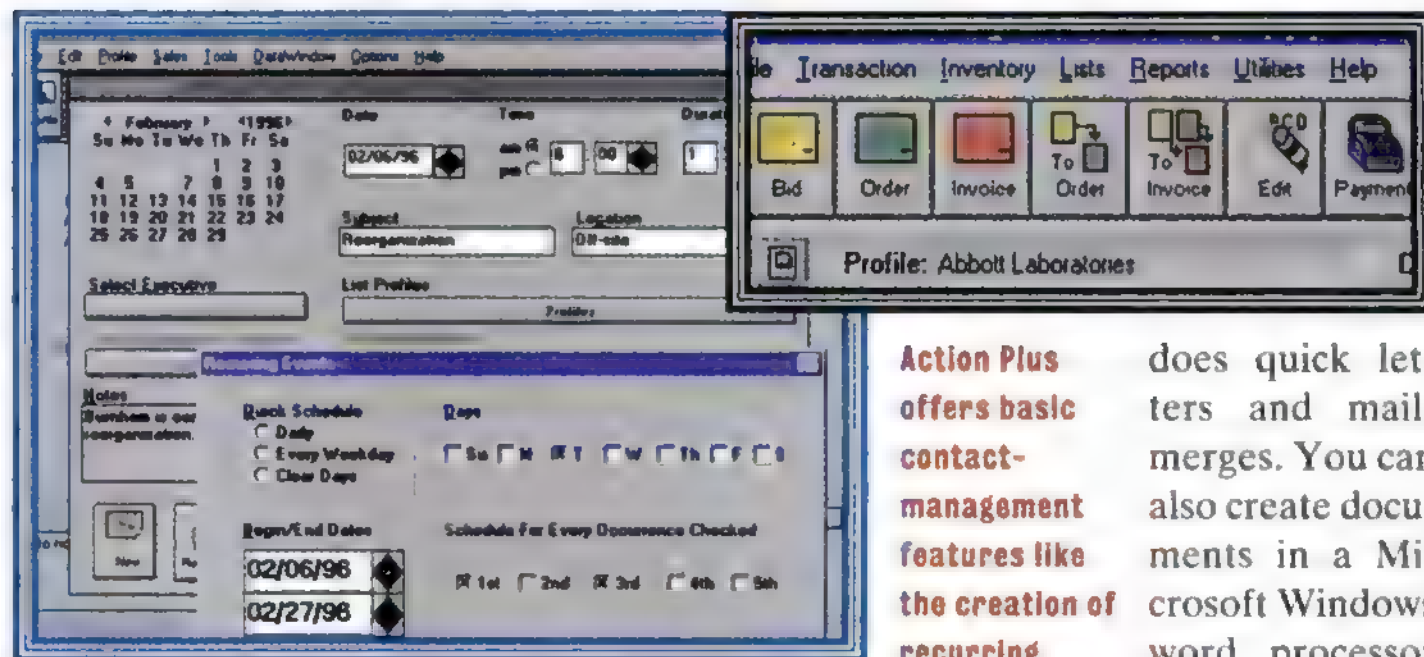
Action Plus Software Inc.

Action Plus for Windows

One of the pricier products in this group, Action Plus 2.0 for Windows (\$395) offers competent contact management, exceptional customizability, and a unique sales-oriented feature set. But free-form information management and some weak aspects of contact and network management hinder Action Plus.

Action Plus's boilerplate contact screens lack depth, but you can redefine every field on the main screen and take advantage of the 14 user-definable fields. You can redesign these Profile screens by dragging and dropping, and designate pop-up fields. If the primary screen isn't deep enough, you can easily create additional DataWindows.

The contact-management tools impressed us less. Action Plus automatically logs documents, tasks, and calls—but with minimal information. You can attach an unlimited number of subordinates to each contact, but Action Plus can't indicate a link, and you have to dig two levels deeper to find a complete record of the secondary contact. You'll have to do the same to see complete



records after you've conducted a simple or more complex Boolean search.

TAKE ACTION

Ample scheduling options include spacious daily, weekly, and monthly calendars that display snippets of your task and appointment descriptions. You can prioritize tasks and assign status levels, but unlike appointments, you can't designate tasks as personal. And while you can designate a phone call or meeting as complete, Action Plus doesn't ask if you need a follow-up date or alarm.

On the bright side, an internal text editor with basic formatting capabilities

Action Plus offers basic contact-management features like the creation of recurring appointments. It also takes sales management a step further by including a sales module (inset), which lets you track inventory and sales.

does quick letters and mail-merges. You can also create documents in a Microsoft Windows word processor and bring contact files over for individual letters. Action Plus also includes an internal fax program.

If you have demanding information-management or network needs, don't look to Action Plus. It offers only rudimentary free-form notepads and limited group-scheduling capabilities. You can modify others' schedules but can't arrange for everyone to attend a meeting. And though mobile employees can synchronize their databases via floppy disk or LAN,

INFORMATION MANAGERS

How to Read the Suitability to Task Boxes

We rate the ability of the products to manage all of the data users might encounter, including traditional contact management and calendaring, as well as management of projects (tasks), and any other random information that they might want to track.

At the most basic level, each product should have strong **contact management** features—the ability to track all necessary information about the people with whom users interact. This task looks at the tools that add and import contacts, as well as search in a variety of ways. Our task also looks at the standard fields provided for tracking information about contacts, the customizability of the contact database, and all other data that can be stored about a contact, such as meeting notes and a history of interactions.

In addition to managing contacts, users must manage the hours in their days. The **calendar and scheduling** task focuses on the single user capabilities of the program's calendar. We look at the ability to add,

SUITABILITY TO TASK		
Product Name		
	Power	Ease
Contact management	Excellent	Excellent
Calendar and scheduling	Good	Good
Task management	Fair	Fair
Information management	Poor	Poor
Workgroup	Poor	Poor
Remote	N/A	N/A
N/A—Not applicable: The product does not perform this task.		

modify, and delete standalone and recurring appointments, the various calendar views' output types, and the links between the calendar and contact database.

Task management looks at the ability to prioritize and maintain tasks such as phone calls and other to-dos. It also looks at the management of entire projects consisting of multiple tasks, meetings, and contacts, and links between the tasks and other areas of the program such as the calendar and contact database.

Most users also need to track random bits of information that are not related to a person or a project. We study the program's ability to satisfy this need in the **information management** task. We look at tools such as outliners for data entry and organization, and the ability to customize databases with specific fields that correspond to the user's method of organizing data.

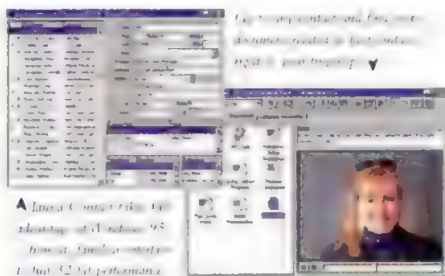
To be an effective **workgroup** product, a program must provide strong security, permitting some information to be shared with others while designating other data as private. We also looked at the program's use of e-mail, whether built-in or external, and the program's ability to act as a group scheduler for meetings and tasks.

Finally, we evaluated the program's **remote** capabilities, including the ability to exchange data with one separate database or more, and the ability to work with a subset of a master database.



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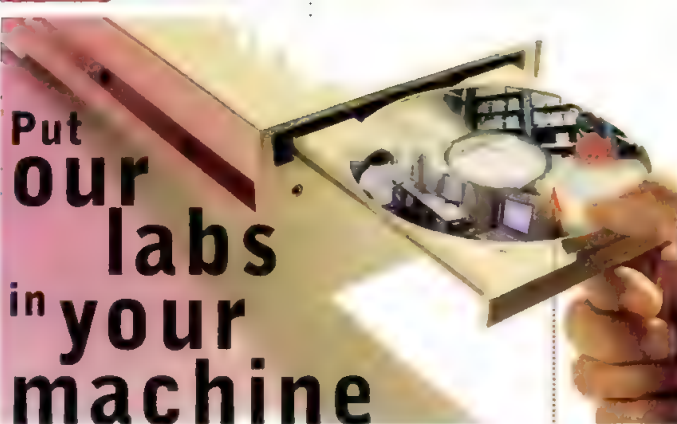
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SOFTWARE*Information Managers*

workgroup capabilities fall short: Action Plus's lack of security lets users see anyone else's contacts and all the fields.

These drawbacks aside, Action Plus uniquely shines: It includes an integrated sales module with templates for creating bids, sales orders, and invoices; generates credit and debit memos; receives payments and tracks histories; creates and maintains inventory files; and links to a few small business and high-end accounting apps.

SUITABILITY TO TASK**Action Plus**

	Power	Ease
Contact management	Good	Good
Calendar and scheduling	Fair	Good
Task management	Fair	Fair
Information management	Poor	Fair
Workgroup	Fair	Fair
Remote	Fair	Fair

In Action Plus, you can access every major function from the program's main screen. The usually straightforward navigation, though, has one little quirk: Operational buttons such as Save and Done appear in an order that's the reverse of most Windows programs. And a more thorough help system and written documentation would benefit Action Plus.

In theory, incorporating some sales-processing functionality into a contact manager is interesting, but Action Plus stumbles a bit in implementation. Smoother overall performance as well as better guidance and detail would make the program more appealing.—*Kathy Yakal*

Action Plus 2.0 for Windows. List price: \$395. Requires: 386SX-based PC or better, 4MB RAM, 10MB hard disk space, Microsoft Windows 3.1 or higher. Action Plus Software Inc., Draper, UT; 800-766-7229, 801-572-2555; fax, 801-572-2444; <http://www.actionplus.com>. Circle 449 on reader service card.

Franklin Quest Co.

Ascend

Franklin Quest's Ascend 5.0 (\$99, estimated street price), an electronic descendant of the paper-based Franklin Day Planner, is a good information manager for existing subscribers to the Franklin system and for users with very basic needs. Yet with unique features such as in-depth guidance for goal setting,



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Ascend distinguishes itself from its competition. Ultimately, though, Ascend doesn't facilitate information management as well as stars ECCO Pro and GoldMine do.

RIISING TO THE CHALLENGE

Ascend's contact-management record template accommodates only rudimentary data about your personal and professional contacts. Though you can't modify these boilerplate fields, you can assign up to six key codes for each record. Ascend gives a generous number of indexed fields

SUITABILITY TO TASK

Ascend

	Power	Ease
Contact management	Good	Good
Calendar and scheduling	Good	Fair
Task management	Fair	Good
Information management	Poor	Fair
Workgroup	Fair	Good
Remote	N/A	N/A

to speed up the simple searches it provides, automatically logs appointments and phone calls with your contacts in a history log, and lets you enter items easily in the log and attach unlimited notes in rich text. But Ascend doesn't include automated processes or connections to contacts.

Scheduling in Ascend is weak: Rather than entering appointment details in an all-encompassing dialog box, you enter some data directly on the schedule grid and the rest with-

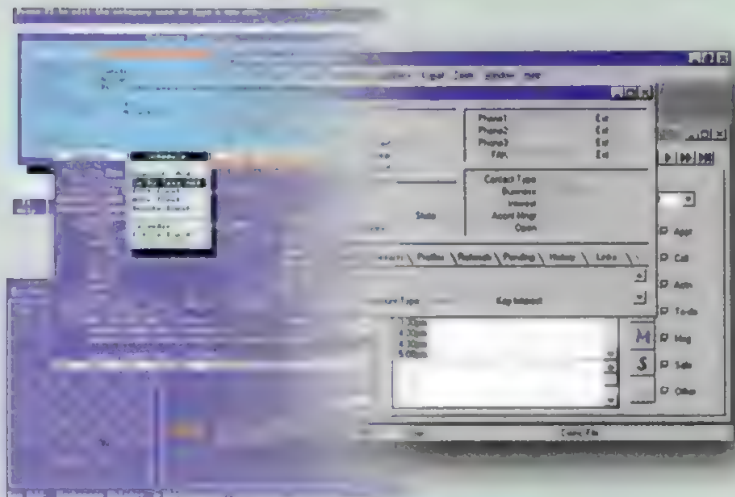
You can enter ongoing, back-burner tasks directly in Ascend's Master Task List, or drag them over from the Prioritized Daily Task List. Ascend handles random information through its Journal and Red Tabs (inset).

in dialog boxes. Alarm options are minimal. You can, however, thoroughly document

appointments and easily connect them to contacts with the attached notes box and the Link icon.

Ascend handles your tasks more creatively. If you continue to roll over a to-do on the Prioritized Task List, Ascend will ask if you want to move it to the Master Task List, a collection of "back-burner" tasks. You can also enter tasks there directly, switch them between the two lists by dragging and dropping or using the Move command, and drag tasks over to the Ascend Mail box to assign them to others. Ascend can also link tasks to contacts or keep them as personal, and tasks can grow out of objectives you've built from Ascend's Personal Productivity Pyramid, an automated four-step path to goal-setting.

The Evolution of Information Managers



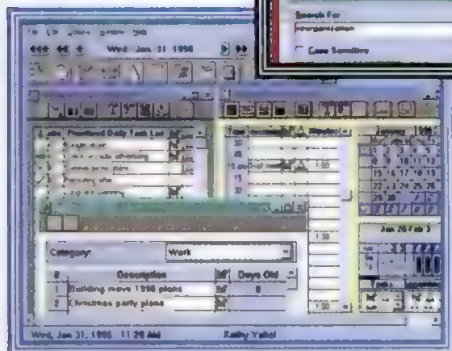
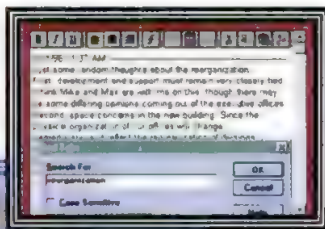
In the old days, salespeople quickly adopted early contact managers, like ACT! on the DOS platform (center), that were built on solid database foundations and revolved around managing your contact history. Then came personal information managers (PIMs), which centered their interfaces around a calendar and tasks. Lotus Agenda (top), perhaps the most revolutionary product in the early years of PIMs, isn't even around today. It had a cult-like following of users devoted to its unusual interface and database-like power. Workgroup schedulers then emerged with products such as WordPerfect Office (DOS version, bottom), adding automated alarms and appointment rollover.

Take a good look at any of the 18 products reviewed here. Some may be more contact-, information-, or schedule-centric than others, but there's also a fair amount of overlap. In almost all of these tools, you can find deep contact management features; smart links that tie together schedules, to-dos, and contact information; network support; and some form of group scheduling. Though all these products are rife with cross-pollination, you'll still probably find a tool that's best suited to your something-centric world. But take note: Full-blown information managers are coming, even though some would say products such as GoldMine (above) prove that they're already here.

Ascend offers two ways to store random personal and professional information, neither of which has automatic links into other parts of the program. Both use Ascend's text editor. If you enter information in the Red Tabs, you can categorize each individual entry and search for text within. The Journal organizes entries by the date you entered them and lets you index each file for faster retrieval later.

Ascend's networking capabilities offer less flexibility in assigning various levels of access rights than other products reviewed here, but the program does provide an internal mail system (only if you have Microsoft Mail or cc:Mail running, though) and some group scheduling. Remote synchronization is not an option yet.

Because Franklin Quest divided Ascend into individual modules, you can display more than one entry screen at a time



(though you may need to resize a little). Ascend's speed and performance are acceptable, but it can take a while to do some simple things, like opening a speed-dialing list with one name.

Ascend's price is appealing, and it's a good electronic companion for Franklin Day Planner users. But if you need exceptional customizability and robust features, better choices exist.—KY

Ascend 5.0. Estimated street price: \$99. Requires: 386-based PC or better, 4MB RAM, 8MB hard disk space, Microsoft Windows 3.1 or higher. Franklin Quest Co., Salt Lake City, UT; 800-877-1814, 801-975-9992; fax, 801-975-9995. Circle 450 on reader service card.

CrossTies Software Corp.

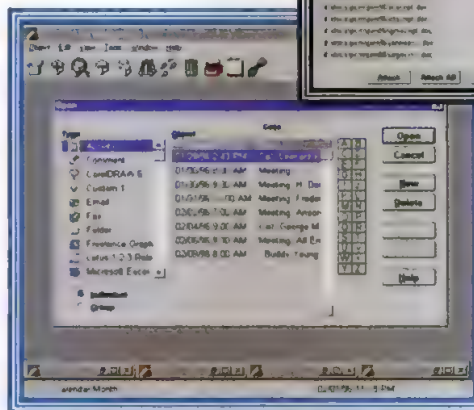
CrossTies for Workgroups

Many programs in this roundup are "something-centric"—closely organized around contacts, schedules, or documents. But in CrossTies for Workgroups 1.0 (a \$299 groupware version of CrossTies for Windows 2.0) from CrossTies Software, everything's an *object*—an approach that reflects the program's underlying data management and contributes to both its strengths and weaknesses.

Contact Management in CrossTies works like this: To enter a contact, you first create a Person object—in this case, for an individual, although you can also make a group a Person object. The Person object becomes a form in a window into which

view (day, week, or month) and you'll find the usual scheduling tools in CrossTies—alarms, recurring events, and printouts that fit standard paper planners.

CrossTies' approach to linking tasks with projects may not be unique, but



As this Open Object dialog illustrates, CrossTies can track almost any kind of information. It can also organize documents, launch programs, and provide links between these and any contact or activity (inset).

that's what it does best. Other elements of task management, such as mailing or tracking contact history, are also available in CrossTies, though sometimes limited. For example, the mail-merge function uses the Windows Clipboard to transfer data, rather than more sophisticated controls like OLE or DDE.

CrossTies uses objects to connect with documents and launch other programs so that it can act like a central clearing house for many kinds of information. Since you can link most objects to any other object, you can create your own custom-made information structure—a powerful option if you have the time to exploit it.

Unfortunately, the somewhat old-style Windows interface—characterized by a flotilla of windows and views—tends to interfere with CrossTies' object linking feature. You may easily find yourself with a cluttered screen without any idea of where you are or where you want to go.

GROUP OBJECTS

The workgroup version of CrossTies shares data via e-mail by copying selected objects from one user into the database of other

users—an updating process that allows for considerable control of security and privacy, but depends on the efficiency of the e-mail system. Not surprisingly, CrossTies includes its own e-mail capability, which is simple and effective, or it can tie into most other e-mail products (MAPI, MHS, or VIM). But the dependency on e-mail during

high volumes of traffic may lead to synchronization problems in cases of network or e-mail failure. And while you can accomplish remote data synchronization with the export/import function of objects, this provides little control other than accepting newer data or checking update conflicts manually. CrossTies offers a unique, personal approach that, as an organizing tool, may work well for some users. Even with an aging interface, CrossTies has retained some appeal, for few other programs offer such flexibility or suitability for handling complex information.—Nelson H. King

CrossTies for Workgroups 1.0. List price: \$299. Requires: 386-based PC or better, 4MB RAM, 4-13MB disk space, Microsoft Windows 3.x or higher. CrossTies Software Corp., Plano, TX; 800-955-8437, 214-407-9996; fax, 214-407-9215. Circle 451 on reader service card.

Day Runner Inc.

Day Runner Planner

Information managers often begin with a date book metaphor and add more sophisticated data-management features, but Day Runner Planner 1.0 acts as little more than a supplement to a paper planner. One of the lowest-priced packages that we've reviewed here (\$75), Day Runner focuses on the needs of neophytes.

Day Runner's interface, easy to understand and use, includes many of the features you expect in a calendar/contact-oriented information manager, but with half the strength. You can search the address book by field, but neither Boolean operators nor full-text searches are available. So unless you remember your contact information, the program won't help you. You can't add fields to the address book either; you can rename only 9 of the 29.

SUITABILITY TO TASK

CrossTies

	Power	Ease
Contact management	Good	Good
Calendar and scheduling	Good	Good
Task management	Good	Good
Information management	Excellent	Good
Workgroup	Good	Good
Remote	Fair	Fair

you enter contact information. Essentially, CrossTies lets you create constellations of linked objects, for example, a company with many contacts connected to many documents, projects, and resources.

Likewise, activities (calls, meetings, tasks) are also objects, each with their own window and views. As group objects, Activities can be displayed in a calendar

Lotus Organizer 2.1. Because WEDNESDAY'S no good for BOB.

12.1

Lotus
ORGANIZER

ORGANIZER 2.1 WITH
GROUP SCHEDULING.

There's some kind of cosmic waffle rule that applies to business meetings: if you reschedule once, you will have to reschedule a dozen times. Because if it isn't Bob, it's Joan, or Gayle or Jorgé. And meanwhile, the perceived importance of any meeting is inversely proportional to the number of times it is pushed back. It's been proved.

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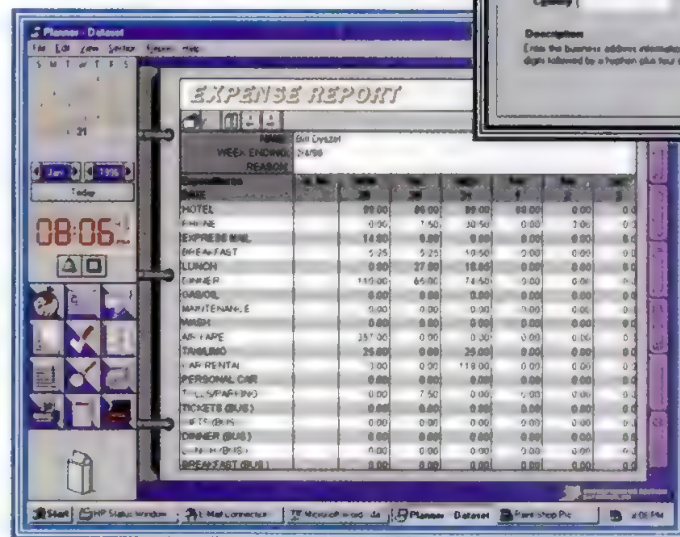
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SOFTWARE

Information Managers

PAR PLANNING

Day Runner's calendar features are average. You can create appointments by dragging from the address book and dropping to the calendar, at which point a dialog box appears with little clock icons for setting the time. You can also change times by dragging and dropping icons on the ruler, but you can't search for free



Day Runner's visual presentation is invariably clear and easy to understand, although it's not an information-management powerhouse. There's nothing remotely difficult to understand; functions are simplified (inset) because choices are limited.

of the entry) to create each line—a far too laborious procedure.

Appearance, Day Runner's strength, resembles the Day Runner tabbed ring binder: The well-designed printed output

SUITABILITY TO TASK

Day Runner

	Power	Ease
Contact management	Fair	Good
Calendar and scheduling	Fair	Good
Task management	Fair	Good
Information management	Fair	Fair
Workgroup	N/A	N/A
Remote	N/A	N/A

time, unfortunately.

You can maintain and print task lists, but you can't manage task information other than dragging it around the calendar to change the due time. Day Runner includes an outline feature, but you have to pull down a menu and fill out a dialog box (detailing the content and level

field to the address book, but if you want, you can change the number of rings displayed in the binder and the design of the trash can.

Undoubtedly, Day Runner is clear and easy to use. But if what you need deviates even slightly from what Day Runner has planned, you can't adapt it to fit your needs. For example, Day Runner presents every address entry with a very attractive embossed title font and prints as impressively, but this format is unchangeable.

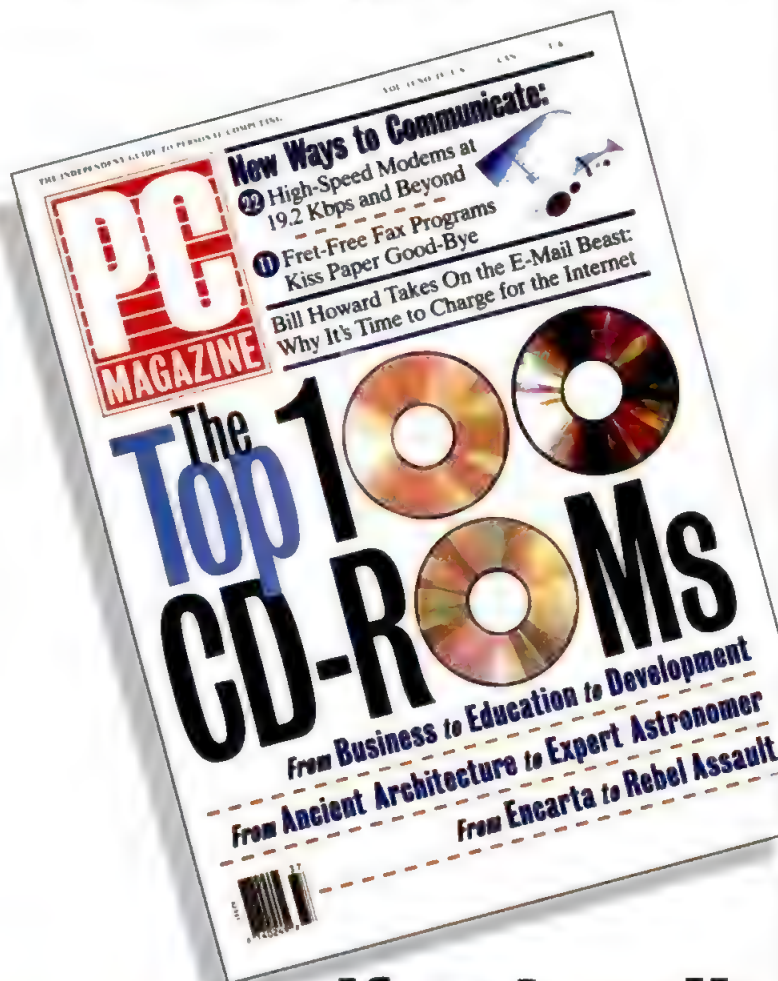
The user who would benefit most from Day Runner Planner must crave neatness and appearance much more than powerful functionality. Think of it as a front end for a paper planner whose strength solely lies in impressive print output—not as an independent information manager. Though Day Runner costs almost the same as Lotus Organizer and Sidekick, it's no easier—especially for a beginner—and far less capable.—*Bill Dyszel*

Day Runner Planner 1.0. List price: \$75. Requires: 386-based PC or better, 8MB RAM, 8MB hard disk space, Microsoft Windows 3.1 or later. Day Runner Inc., Fullerton, CA; 800-232-9786, 714-680-3500; fax, 714-680-0542. *Circle 452 on reader service card.*

and the display screens both have the same visual appeal as the paper version. In fact, it seems that Day Runner devoted more effort to creating visual design than useful information management features. You can't add one


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Day-Timer Technologies

Day-Timer Organizer

Day-Timer Technologies offers the least expensive product in this roundup, Day-Timer Organizer 2.0 (\$59.95). With the low price come some new functions and features that far exceed Day-Timer's popular paper counterpart, but the package still lacks the depth and functionality found in the more robust products reviewed here.

Importing ASCII files into Day-Timer—a 16-bit application that runs on Windows 3.1 and Windows 95—was very slow on Windows 3.1: Day-Timer took more than 4 hours to import 2,000 records. Thankfully, under Windows 95, the same operation took less than half an hour. In both cases, the data arrived intact.

For contact management, Day-Timer uses an address book metaphor that lacks the Organizer's good looks but is still useful. Double-click on a contact, and you'll

SUITABILITY TO TASK

Day-Timer Organizer

	Power	Ease
Contact management	Good	Good
Calendar and scheduling	Good	Good
Task management	Fair	Fair
Information management	Good	Fair
Workgroup	Good	Good
Remote	Fair	Fair

find details about the contact split into ten different tabs—phone numbers, home address, notes, work address, and so on. Unfortunately, you can't view them all at once. These cumbersome tabs appear throughout the program, not just in the address book, and they hide much of Day-Timer's power. For example, one of the tabs, linked entries, lets you link a contact to anything (a note, address, or schedule), though Day-Timer could link even faster if it used drag and drop. Day-Timer searches virtually anything, however, and very quickly.

Day-Timer's calendars make scheduling fairly easy: You can view the daily, weekly, and monthly views simultaneously, and a double click on any event brings up plenty of information-entry options. Day-Timer also conveniently recognizes shortcuts, such as "3p" for "3:00 P.M." In addition, Day-Timer provides helpful phone-dialing features and printing options. You can search and specify the

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information you want printed—calendar views, contact information, labels, expense forms, and much more. And Day-Timer makes printing duplex pages easy.

Day-Timer's basic task management proved satisfactory: It lets you prioritize tasks and automatically rolls over uncompleted tasks. Day-Timer offers a decent mail merge function and links to word processors.

Day-Timer's network version offers improved group scheduling with reasonable security, and it should satisfy most users.



With Day-Timer's calendars, its strong suit, you can jump from daily to weekly to monthly views by clicking on the appropriate icons in the upper left hand corner. A double click on the calendar will bring you to a dialog box (inset) that lets you specify information.

You can assign or notify individuals to attend a meeting or perform a task, though you must first create a group of individuals to schedule several users at once. Acceptable e-mail connections, both built-in and external via Microsoft Mail or cc:Mail, exist in Day-Timer.

Though Day-Timer was relatively stable, on our remote-synchronization tests it performed less reliably, and random crashes occurred during the process. Representatives from Day-Timer Technologies, which should be shipping a 32-bit Windows 95 native version of the product by the time you read this, said that they plan to fix the synchronization inconsistencies.

Ultimately, Day-Timer still can't claim the info-centric niche occupied by products such as ECCO Pro, nor can it manage contacts as seamlessly and reliably as Gold-Mine.—Yvonne Koulouthros

Day-Timer Organizer 2.0. Estimated street price: \$59.95. Requires: 386-based PC or

better, 4MB RAM, 4MB hard disk space, Microsoft Windows 3.1 or later. Day-Timer Technologies, San Mateo, CA; 800-225-5005, 415-572-6260; fax, 415-572-9675. *Circle 453 on reader service card.*

Okna Corp.

DeskTop Set for Windows

The last time we reviewed DeskTop Set for Windows, it received an Editors' Choice for its powerful, high-end features and attractive interface. The latest upgrade from Okna Corp., Version 5.0 for Windows (\$195), beefs up phone-call capabilities and provides easy access to more information. On the other hand,

DeskTop Set is a bit sluggish compared to some of its competitors, and it has difficulties performing simple tasks such as searching and sorting contacts' addresses by state.

DeskTop Set includes strong phone-call features for contact management. Caller ID support can define an automatic response to any caller or class of callers. For example, records of known customers can pop up when they call. If you have a pager, the program can pass appointment reminders and Caller ID information to your pager. And registered users should receive a free TAPI-compliant upgrade in June.

These cutting-edge features aside, DeskTop Set's tools for searching the address database lack intuition and some standard Windows features, such as multiple-record selection. The standard address fields consist of three generic lines, one of which automatically combines the city, state, and ZIP code—which makes certain kinds of geographic searches difficult. The program also doesn't automatically alphabetize address entries, but you can create mnemonic entries

as shortcuts to the real entry; for instance, besides your mother's actual name, you can find her under "M" for "Mom."

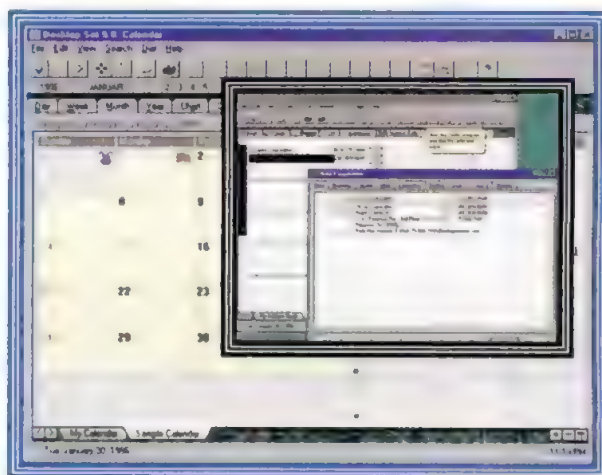
The calendar module uses two sets of tabs—one for changing the view, the other for multiple calendars. You can have an unlimited number of calendars available at one time, which allows you to coordinate several people's schedules. The calendar's monthly view does not include text to describe entries like ECCO Pro does, but it instead uses colored squares to represent scheduled events. This way, more information fits, but it's harder to understand.

NOT THE BEST SET

DeskTop Set's task management includes a to-do list in the calendar. You can assign priority and due date, and link address, dialing information, or a file from another application. Also, the tabbed page design gives you easy access to several lists at once, and extensive drag and drop capability simplifies data entry.

You can perform Boolean searches on up to eight address book fields and search all fields if you set them up properly. Importing a database, though, was very slow—well over an hour for 2,000 records. (ECCO Pro did the job in 75 seconds on the same platform.) Data export speed was much snappier; 100 records took under 2 seconds, as fast as any other product.

DeskTop Set's calendar and address book (inset) are separate functions which link to each other, although the monthly calendar view uses icons—not text like in the address book—to indicate events.



Workgroup functionality mainly consists of opening and viewing several datafiles at once for schedule coordination. The program does allow the sharing

SUITABILITY TO TASK

DeskTop Set for Windows

	Power	Ease
Contact management	Good	Fair
Calendar and scheduling	Good	Fair
Task management	Good	Fair
Information management	Fair	Fair
Workgroup	Good	Fair
Remote	N/A	N/A

of contact databases and the ability to designate contacts as public or private and rights as view-only or modifiable. But DeskTop Set doesn't provide remote synchronization.

The impressive integration of telephony is no doubt DeskTop Set's strongest suit, but the package ultimately tries to take on more than it can handle, and as a result loses its once-renowned flexibility needed to accomplish some of the simpler tasks.—*BD*

DeskTop Set 5.0 for Windows. List price: \$195. Requires: 386-based PC or better, 4MB RAM, 5MB hard drive space, Microsoft Windows 3.1 or later. Okna Corp., Paramus, NJ; 800-438-6562; 201-909-8600; fax, 201-909-0688; <http://www.okna.com>. Circle 454 on reader service card.

NetManage Inc.

ECCO Pro



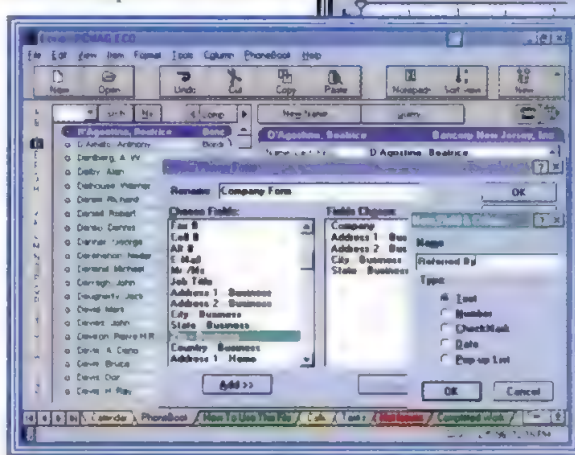
NetManage's ECCO Pro (\$139) capably balances free-form information management and structured forms. Version 3.0 includes new contact management abilities, links to other applications and the Internet, and superb workgroup tools. ECCO's overall customizability make it a superior product.

ECCO offers an easy import process and generous parameters. The PhoneBook's contact record provides plenty of prefabricated and user-defined fields. You can create your own phone forms, cluster contacts under one company record by dragging and dropping, and search quickly on limited fields or apply a more complex Boolean filter. You can send individual letters, e-mail, and faxes, or mail-merge by

linking to your Windows word processor. And ECCO's Shooters, small menus that appear in every other app when ECCO is active, let you move data back and forth between ECCO and other programs.

ECCO offers exceptional scheduling options. You can drag a name from the PhoneBook and drop it on the calendar to schedule an appointment, or leave it unlinked. A click to the left of the event opens a floating scheduling toolbox that lets you further shape it by setting alarms, designating it as recurring, and so forth. Setup procedures and output options for printing calendars are quite thorough.

ECCO's workgroup setup procedures performed flawlessly when we tested on a Windows 95 network. It respects both privacy and the need for shared information: While you can share calendars, phonebooks, and



Part of ECCO Pro's impressive customizability shows here. You can create your own PhoneBook Forms to supplement the four provided. As long as ECCO Pro is running, its Shooters (inset) stay active in other applications.

ECCO will automatically launch your Spyglass-compatible Web browser and go to a highlighted URL. You can then shoot a URL and a page's title—not the text or graphics on the page itself—back to ECCO. A strong built-in synchronization feature lets mobile workers keep their databases updated via e-mail, floppy disk,

or remote network log-on.

What really sets ECCO apart, though, is a unique structure that accommodates unstructured information management better than any of its peers. You can use outlines (the default structure which you can change) in the Calendar and PhoneBook to create tiered lists of data, and you can design your own in the Notepad to manage projects or tasks, or just to keep organized notes. Notably, ECCO equips you with a real outliner for taking notes; you don't enter data in a free-form text screen.

With ECCO's Folders, you can cross-reference most items in ECCO to any others and look at cross-sections of your database in numerous views. ECCO

doesn't restrict you to creating an object for everything. And you can use the Notepads to take rough notes on something

that wouldn't fit into an object-oriented environment.

ECCO's unusual structure may take a while to absorb, but its clean interface and rational navigational structure help shorten the learning curve. And an effective combination of structure

and chaos supervision makes ECCO Pro 3.0 one of the top information managers available.—*KY*

ECCO Pro 3.0. List price: \$139. Requires: 386-based PC or better, 4MB RAM, 6MB hard drive space, Microsoft Windows 3.1 or later. NetManage Inc., ECCO Division, Bellevue, WA; 800-457-4243, 206-885-4272; fax, 206-885-0127; <http://www.netmanage.com>. Circle 455 on reader service card.

SUITABILITY TO TASK

ECCO Pro

	Power	Ease
Contact management	Good	Good
Calendar and scheduling	Excellent	Excellent
Task management	Excellent	Good
Information management	Excellent	Fair
Workgroup	Excellent	Good
Remote	Good	Fair

GoldMine Software Corp.

GoldMine for Windows 95



GoldMine Software Corp. didn't rest on its laurels after GoldMine won an Editors' Choice the last time we reviewed it. Now, GoldMine for Windows 95 (\$295) comes with more than just a 32-bit code and a facelift. It includes new features such as Internet e-mail support, InfoCenter (free-form text and multimedia management), and a new report generator. As a bonus, GoldMine hasn't lost any of

SOLID GOLD SCHEDULING

The calendar in GoldMine, while not quite as fluid to use as schedule-oriented products like Lotus Organizer, offers all the important features: multiple views, alarms, drag and drop, recurring events, and above all, tight integration with workgroup scheduling. You can easily send invitations to meetings or assign tasks and have GoldMine handle the e-mail mechanics.

While GoldMine tries not to over-emphasize its sales orientation, it has plenty of features including telemarketing scripts, various kinds of sales analysis (leads, quotas, forecasts), and a surpris-

ingly flexible graph generator. When you integrate these features using custom reports and GoldMine's Automated Processes,

you can develop a sophisticated sales force-automation environment. GoldMine also handles standard task management such as to-do lists and mail merge capably—although unlike Microsoft Schedule+, it doesn't display project-oriented tasks that take place over days or months.

CENTER FOR INFORMATION

To cover information management, GoldMine has added the InfoCenter. A knowledge base similar to the Windows help system but without hypertext links, InfoCenter lets you store and retrieve reams of text information, such as company price lists or personal notes.

As a workgroup product, GoldMine is the first contact manager that not only sends and receives Internet e-mail effectively, but also uses the Internet for synchronizing data. GoldMine has also added a modem connection to pagers and standardized its telephony with TAPI. All of this combined with the existing e-mail, fax, and network support makes GoldMine a strong communications manager. In addition to the Internet connection, GoldMine's solid remote synchronization features include field level updating and filtering of data. GoldSync (\$495 for one server and three nodes), an add-on product, provides automation of remote synchronization.

GoldMine Corp. has successfully cre-

ated a contact-centric information manager that provides complex features and workgroup capability for those who need it while remaining reasonably friendly at the personal level. Though competitors may provide simpler interfaces or more hand-holding, GoldMine remains highly recommended as one of the most comprehensive and best performing information managers on the market.—NHK

GoldMine for Windows 95. List price: \$295. Requires: 386-based PC or better, 6MB RAM, 8MB hard disk space, Microsoft Windows 95. GoldMine Software Inc. (formerly ELAN Software), Pacific Palisades, CA; 800-654-3526, 310-454-6800; fax, 310-454-4848; <http://www.goldminesw.com>. Circle 456 on reader service card.

Corel Corp.

InfoCentral

Corel Corp.'s InfoCentral 1.1 (\$99) emerges as one of the most flexible, open-ended information managers available. Rather than using a collection of forms, it treats every piece of information as an object that you can link to other objects. This lets you maintain databases of intricately connected and

SUITABILITY TO TASK

InfoCentral

	Power	Ease
Contact management	Good	Fair
Calendar and scheduling	Good	Good
Task management	Good	Fair
Information management	Excellent	Fair
Workgroup	Fair	Fair
Remote	Poor	Good

timeless data. The tradeoff is a harder learning curve.

Some of InfoCentral's procedures are easy and thorough, such as its import process, in which you can split each contact record into two objects: Organization and Person. Adding records directly is equally uncomplicated, though you enter data in a series of dialog boxes rather than in a cohesive form. You can edit and add fields to any object template by selecting from field options. And InfoCentral includes generous search options. You can conduct a fast search and just enter a fraction of the targeted text, search for specific files, or locate objects by example or connection.

SUITABILITY TO TASK

GoldMine for Windows 95

	Power	Ease
Contact management	Excellent	Good
Calendar and scheduling	Good	Good
Task management	Excellent	Good
Information management	Fair	Good
Workgroup	Excellent	Good
Remote	Excellent	Good



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MEETING CENTRAL

InfoCentral lets you view appointments and tasks in an outline or in a familiar graphical calendar. You must go through a series of dialog boxes to define each object on the calendar. In InfoCentral, you don't have to link schedule objects to other objects, but you can easily connect them as you're defining them. Setting up

recurring events is where Info-Central

But if you need hearty workgroup capabilities or flexible remote synchronization, InfoCentral is not your best choice. You can exchange e-mail and files with other workgroup members using your network's own e-mail system, but you must have Novell's GroupWise software to do group scheduling. InfoCentral does have remote synchronization capabilities, but only via disk and e-mail.

The same thing that makes Info-Central an inordinately customizable information organizer also works against

it. Its structure is difficult to comprehend—more abstract than other object-oriented information managers such as CrossTies and ECCO. If you must have free-form information

NOT LIKE THE OTHERS

You can't directly compare Info Select with the other personal organizer programs we've reviewed here; it's intended to do an entirely different kind of job with an entirely different type of data. Those who need quick access to diverse scraps of data will find Info Select extraordinarily useful. It would make sense to use it alongside a calendar and address manager and have Info Select store and retrieve all the bits and pieces of unrelated information you want to keep but usually can't find again.

Some extremely useful and innovative products had trouble in the marketplace at first because no comparison existed. Thus, the typewriter begat the word processor, the calculator begat the spreadsheet, and the datebook begat the PIM, but Lotus Notes was hard to sell at first because it was hard to explain. Similarly, Info Select is useful, innovative, and hard to explain—and it's an unquestionably valuable tool that finds the information you need.

DATA-BASED

Most information managers focus on specific types of information management. Info Select differs from all the other products we've evaluated here, as contact management and calendar management clearly take a back seat to free-form data management. Info Select includes name and address information as part of the main database, which you can search and customize fully, but organizing the results of a search may frustrate you. The package's call automation offers nothing more than a simple phone dialer, and workgroup functionality only lets different users simultaneously view files. Only one user can edit the file at a time.

The fairly rudimentary calendar functions, new to this version, enable you to set recurring appointments and alarms, but Info Select provides only a few options for viewing and printing calendar

When someone in your contact database changes jobs, InfoCentral lets you create a new connection without deleting the old one. Also, if any record structure doesn't meet your needs, you can add or modify existing ones (inset).

veers from the norm. The program asks you how many separate events there will be, which may be hard for you to calculate.

You can build tasks in detail, too: Prioritize them, indicate their status, designate them as completed or abandoned, and delegate them. Because of InfoCentral's distinct structure, you can connect any number of objects to each other—which makes it a powerful tool for people who must regularly track tasks, events, and people.

InfoCentral handles correspondence via its link to your outside word processor. Individual letters appear in each object's links. While InfoCentral doesn't offer a history log, it delivers similar information.

30 RANDOM

InfoCentral's framework makes it a highly effective random-information manager. Just as you can link traditional objects like people and events, you can also create your own types of objects and link them to others, using all of InfoCentral's data development and manipulation tools.

management with unlimited connecting capabilities, though, it may be worth your while.—KY

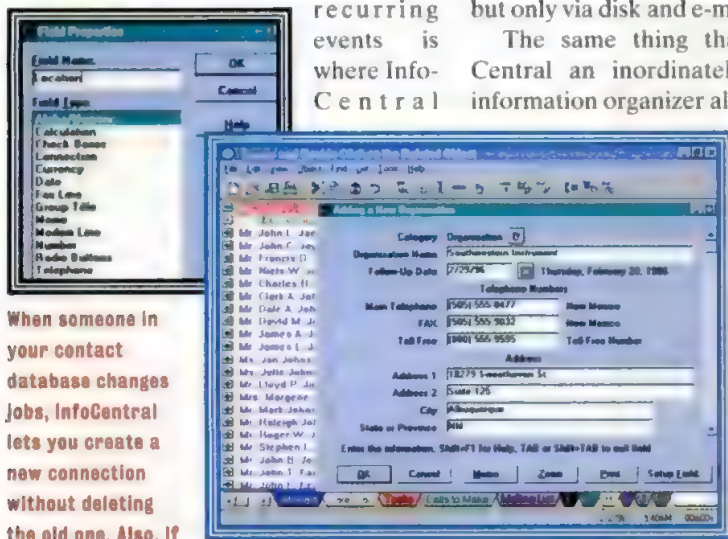
InfoCentral 1.1. Estimated street price: \$99. Requires: 386-based PC or better, 4MB RAM, 5MB hard disk space, Microsoft Windows 3.1 or later. Corel Corp., Ottawa, Ontario, Canada; 800-772-6735, 613-728-3733; fax, 613-728-9790; <http://www.corel.com>. *Circle 457 on reader service card.*

Micro Logic Corp.

Info Select

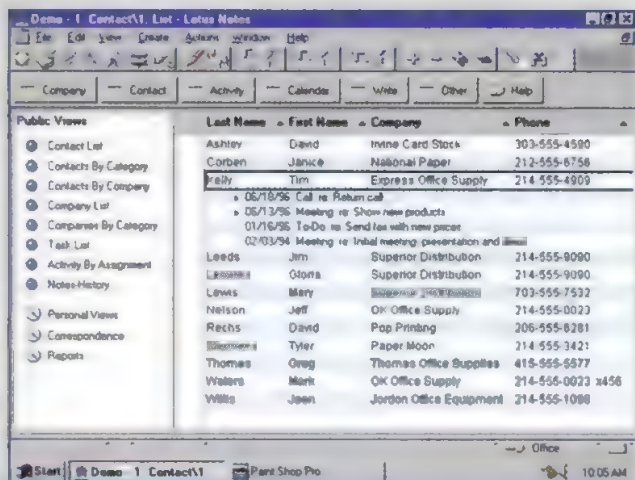
If your own information management system looks less like a date book and more like a pile of yellow sticky notes, Micro Logic Corp. designed Info Select 3 (\$149.95) with you in mind.

While Info Select can manage addresses and appointments, it's really a free-form database that lets you enter items in fairly random order and retrieve them with a kind of triple-jointed search engine that uses a neural search strategy as well as Boolean search methods. Not only can Info Select manage a wide range of data types, but it finds what you want—fast.



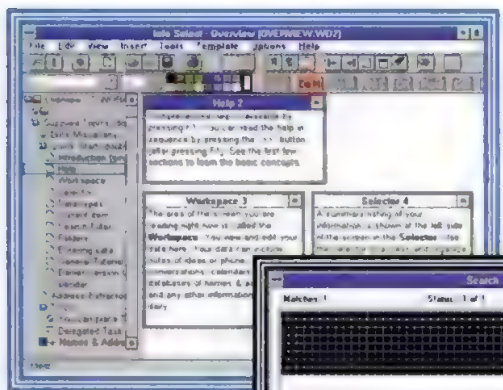
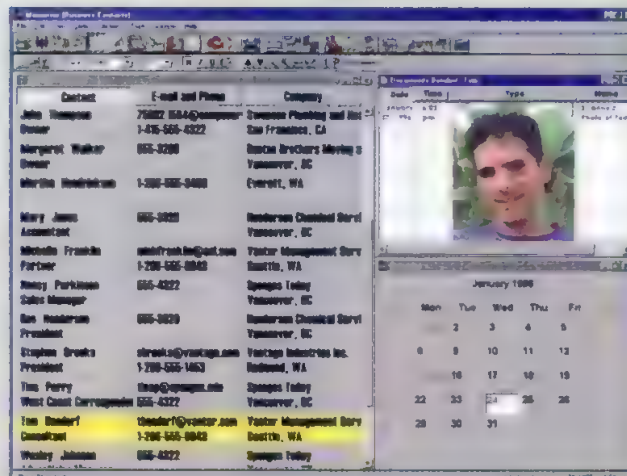
SUITABILITY TO TASK		
	Info Select	
	Power	Ease
Contact management	Fair	Poor
Calendar and scheduling	Fair	Fair
Task management	Poor	Poor
Information management	Excellent	Good
Workgroup	Poor	Poor
Remote	N/A	N/A

The Evolution Continues: Updated Info Managers



ACT! for Lotus Notes Although ACT! for Windows had not upgraded since our last review (and was therefore not included in this evaluation), Symantec Corp. (800-441-7234, 408-253-9600) says a new version should ship by midyear. Symantec also plans to ship ACT! for Notes in the first half of this year. The Notes 4.0 application will provide nearly all the same functionality of ACT! for Windows, including contact management and scheduling, but will also capitalize on Notes's rich workgroup and remote capabilities. Users will be able to migrate their existing ACT! data to the new product.

Maximizer 3.0is for Windows 95 Similarly, Maximizer 3.0 had not upgraded significantly since our last review. But by the time you read this, Maximizer Technologies (800-804-6299, 604-736-9666) should be shipping Maximizer 3.0is for Windows 95 (\$149). Among the promised enhancements is Internet ability (hence the "is," which stands for "Internet savvy"). For instance, with the Maximizer World Wide Web site (www.maximizer.com), users will be able to access and retrieve selections from the company's database of more than 11 million businesses in the U.S. and Canada.



Info Select's free-form database lets you enter data any way you like, then figure out how to handle it. It searches all data types (inset) using the same engine.

information; searching the calendar is not as flexible as searching in the main database, unlike in ECCO.

A useful information manager should also present a clear screen that explains itself; you shouldn't have to frequently resort to the documentation. Plan to spend some time with it to understand the way it organizes and presents information: In its

interface, Info Select approaches most of the concepts Windows users naturally expect—opening files, and moving and copying information—very differently. Although perhaps not a drawback, the approach Info Select applies to its interface resembles the program's DOS predecessor

more than it does a Windows application. In fact, you may come to appreciate the convenience of the product's one-keystroke shortcuts.

Info Select is certainly not for everybody, but if you need an unusually flexible information management tool, it may just fulfill your needs.—BD

Info Select 3. List price: \$149.95. Requires: 386-based PC or better, 4MB RAM, 2MB hard disk space, Microsoft Windows 3.1 or later. Micro Logic Corp., Hackensack, NJ; 800-342-5930, 201-342-6518; fax, 201-342-0370; <http://www.miclog.com>. Circle 458 on reader service card.

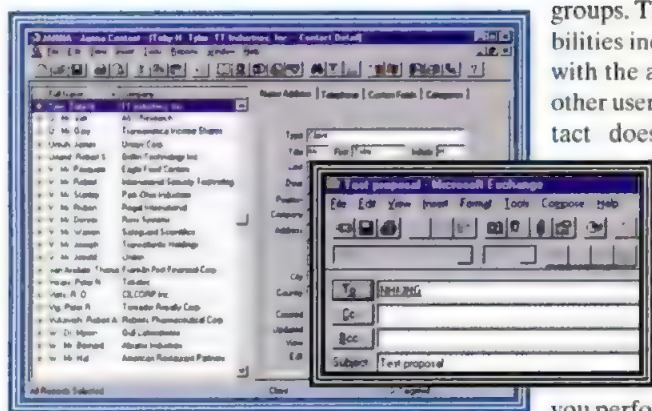
Janna Systems Inc.

Janna Contact 95

As one of the few programs in this evaluation to carry the Microsoft certification for both Windows 95 and Microsoft Office, Janna Contact 95 (\$159), from Janna Systems has hitched itself to the Microsoft bandwagon to provide an integrated environment for users of Microsoft Office. The program emphasizes both contact and document management, and features extensive use of OLE 2.0 to connect with other Office products. Unfortunately, we found the program to be uncomfortably slow during many crucial operations.

Normally, we would consider Janna Contact's contact management satisfactory at least, but even with fast hardware Janna produces unpleasant delays when it moves between parts of the program or when data changes. For example, with a Pentium-class system, it required as long as 62 seconds to open a form for a new contact, and 25 seconds to search only 2,000 records for a single criteria.

Most users will find the pauses in the



The main contact window in Janna Contact is a model of flexibility and clean design. Within the Document Manager, Janna Contact lets you e-mail documents (inset) to anyone in a workgroup.

features like Quick Pick for selecting default values, and custom fields that automatically appear with specific contact types.

TIME, DATE, AND LINKS

Janna Contact provides a standard set of scheduling features such as alarms, multiple calendar views, and reports that fit standard planner formats. Of special note are shortcuts: You can type directly into the calendar or drag and drop a contact name into the calendar to start a new entry.

Task management (called activity management) is integrated closely with the calendar and offers features such as a history of all activity and the ability to embed OLE objects into activity items. You can even add videos and sound, if that helps your working environment.

Janna Contact successfully incorporates documents of all kinds into the framework of contact management. The Document Manager window is a model of OLE 2.0 capability, supporting drag and drop, in-place editing, and a Windows Explorer-like interface. It also provides links from the documents to activities and contacts so you can keep track of all your correspondence and associated information efficiently.

Configuring Janna Contact for a network is easy, and you have some flexibility in defining users, security, and work-

program a hindrance. If Janna Contact can remedy the performance problems, the program has a lot to like: a handsome design, an unusual number of data-entry features

groups. The basic multiuser capabilities include a shared database with the ability to see and add to other users' schedules. Janna Contact doesn't exploit its group scheduling potential for features like project planning or automatic finding of best meeting times, but Janna Contact's two-way connection to Microsoft Schedule+ lets you perform these functions.

Workgroup capabilities include solid integration into MAPI-based e-mail systems like Microsoft Exchange. Remote synchronization of data is available in a separate product, Janna Remote (\$99).

Janna Contact 95 focuses on those who need fully featured office contact management without a heavy sales orientation. It provides a nicely designed and familiar Microsoft Office environment, despite its overall slowness, which Janna

SUITABILITY TO TASK

Janna Contact 95

	Power	Ease
Contact management	Good	Fair
Calendar and scheduling	Good	Good
Task management	Fair	Fair
Information management	Good	Poor
Workgroup	Fair	Good
Remote	N/A	N/A

Systems has acknowledged. It is working on the performance problems and will post maintenance releases to licensed owners through its Web site.—*NHK*

Janna Contact 95. List price: \$159. Requires: 486/66-based PC or better, 12MB RAM, 8MB hard disk space, Microsoft Windows 95. Janna Systems, Inc., Los Gatos, CA; 800-268-6107, 408-356-6647; fax, 408-358-5423. <http://www.janna.com>. Circle 459 on reader service card.

Lotus Development Corp.

Lotus Organizer

Imitating a planner book format is no longer a novel idea, but Lotus Development Corp. continues to refine Organizer and improve the metaphor it made popular. Many a user will find Lotus Organizer 2.1 (\$99) instantly useful and capable.

The tabbed pages of the on-screen planner book de-emphasize the role of contacts and highlight the use of links between items. Organizer links better than many other programs, at least for navigating through information. It includes most of the usual contact management features such as telephone dialing, searching, and data security, and you can create new tabs to organize your own projects or information. But unlike GoldMine, for instance, it doesn't let you do much to extend or customize the information fields.

MAKE A DATE

The now-standard calendar views (also popularized by Organizer) best demonstrate Show Through, a unique feature in an interface full of inventions that lets you optionally see related data elements right next to each other—while also preserving the planner book metaphor. This provides a clever way to selectively combine information without displaying a limited view that can frustrate viewers.

Although it has a to-do list, Organizer doesn't offer extended task management (Organizer can only mail-merge with a macro program from Lotus Ami Pro), automated processes, or sales-oriented follow-up. But it does provide a Planner tab with a project management-style chart and uses a nifty felt-tip-pen metaphor to draw bars representing tasks and events.

While most information management consists of using the Notepad tab and its ability to link to external files, you can also create unlimited tabs for non-contact related info. Organizer has user-definable Categories (like clients, expenses, or personal) which can group almost any kind of item as a means of organizing and selecting information. We found this feature powerful and deceptively simple.

SUITABILITY TO TASK

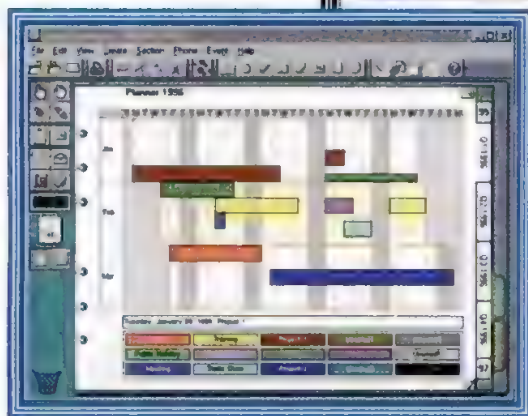
Lotus Organizer

	Power	Ease
Contact management	Good	Good
Calendar and scheduling	Excellent	Excellent
Task management	Good	Good
Information management	Good	Good
Workgroup	Good	Good
Remote	Fair	Fair

WORKING TOGETHER

Organizer supports workgroup information on two fronts—by sharing data and scheduling. To share data, you can simply create tabs that pull information (contacts, to-do lists, notes) from any allowed Organizer network file. For workgroup scheduling, Organizer uses a separate program, Scheduling Agent, that produces sophisticated results, but you must integrate it with Lotus Notes or cc:Mail. Like Schedule+, it can determine optimal scheduling times.

Lastly, you can take Organizer files on the road and re-incorporate the data with a crude Merge feature that has no controls



Famous for its planner book look and fool, this page in Lotus Organizer provides an overview of events. The colored bars are events that "show through" from the Planner page into the calendar mode (inset).

other than manual review of changes. Lotus acknowledges their meager synch support and plans to offer more solid synchronization incorporated with Lotus Notes later this year. Whether as part of Lotus SmartSuite or a standalone product, Organizer's appeal boils down to the interface. Few other products succeed like Organizer in intuitiveness and enjoyable use. If the lack of sales orientation or sophisticated contact management doesn't matter to you, Organizer won't let you down.—NHK

Lotus Organizer 2.1. List price: \$99. Requires: 386-based PC or better, 4MB RAM, 8MB hard disk space, Microsoft Windows 3.1 or later. Lotus Development Corp., Cambridge, Massachusetts; 800-343-5414, 617-577-8500; fax, 617-253-9150; <http://www.lotus.com>. Circle 460 on reader service card.

Microsoft Corp.

Microsoft Schedule+ for Windows 95

Usually purchased as part of Microsoft Office, Microsoft Schedule+ for Windows 95 (available separately for \$99.95) works best when coordinating schedules with users of Office and Microsoft Exchange. This new version of Schedule+ includes more useful contact and task management capabilities, but it still stays in the shadow of the more robust information managers on the market.

Schedule+'s contact management is convenient but not very deep; for example, it doesn't include features like data customization or contact linking. The well-designed program does take advantage of Windows 95 visuals such as tabs and shortcut menus. Schedule+ displays contacts in both list and detail format on the same screen, so you can easily navigate through the names, and

you can also switch the list to display in groups—such as by state and then company—so you can quickly locate related names. Dialing phone numbers from the contact list requires just a click, but unlike in Action Plus or GoldMine, you won't find any automatic follow-up or categorization of call results.

As befits a schedule-oriented program, Schedule+ always opens with a calendar view. This part of the program uses the most up-to-date scheduling tools like drag and drop of events, display of different calendars, and one of the best recurring-event managers we've seen. As a bonus, Schedule+ includes an integrated tool which contains text from Steven Covey's *Seven Habits of Highly Effective People*,

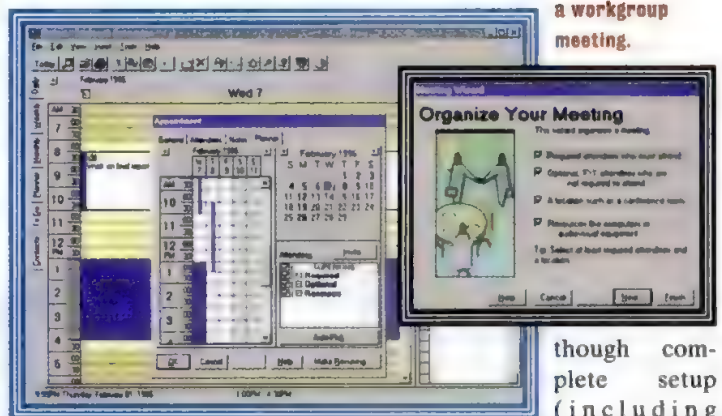
which offers ways to help you organize your time and your life.

Schedule+'s task management uses helpful project orientation. You can create a project and attach to-do items, although you can't differentiate between calls and other tasks. Schedule+ then organizes the display of the to-do list by project and can provide a quick overview of the status. You can enter notes attached to other items, but you can't outline extensively (like you can with ECCO Pro), enter random information (like into Ascend's Red Tabs), or link to other documents (like GoldMine can).

GROUP TIMING

Schedule+'s strength lies in workgroup scheduling, including task assignment and shared contacts. Using Microsoft Exchange, it maintains a synchronized view of each person's schedule. When you need to set up a meeting, the Meeting Wizard is available to step you through a sophisticated set of options to select attendees and resources (rooms and equipment), find open times, and communicate the request for a meeting through e-mail. The scheduling takes into account tentative meetings and has a satisfactory security scheme. The scheduling process works well,

With the calendar and the planner window, Schedule+ lets you easily coordinate schedules with other people, and the Meeting Wizard (inset) helps you cut through the complications of setting up a workgroup meeting.



though complete setup (including Microsoft Exchange) requires experience with networks and e-mail systems. In addition, Windows 3.1 users can only see the free and busy times in schedules of Windows 95 users.

Schedule+ makes some provision for

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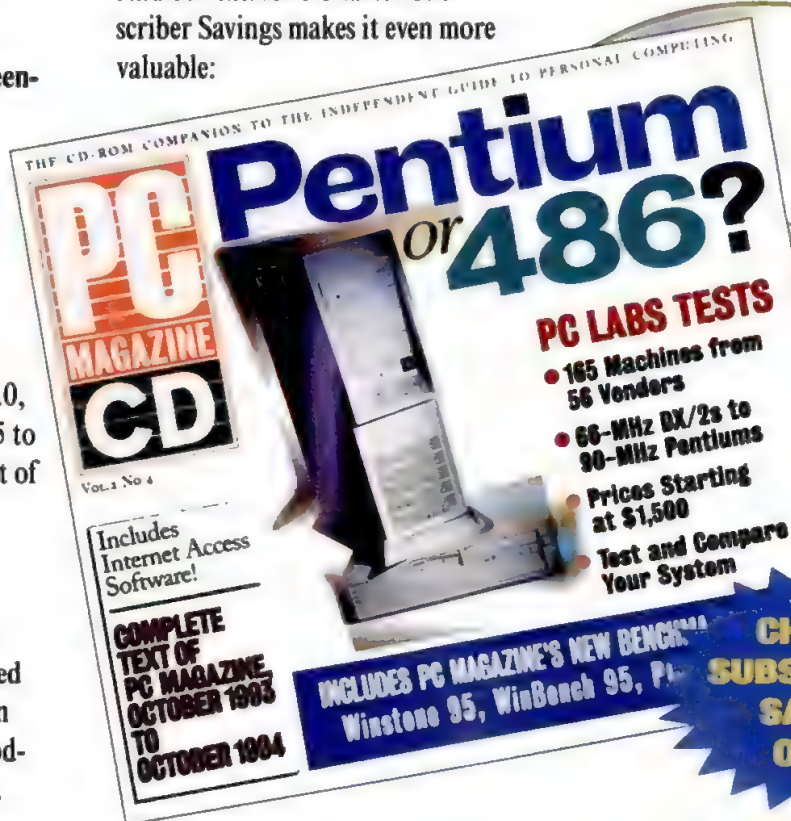
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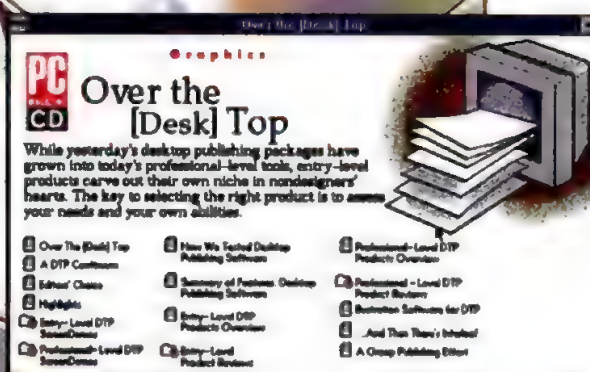
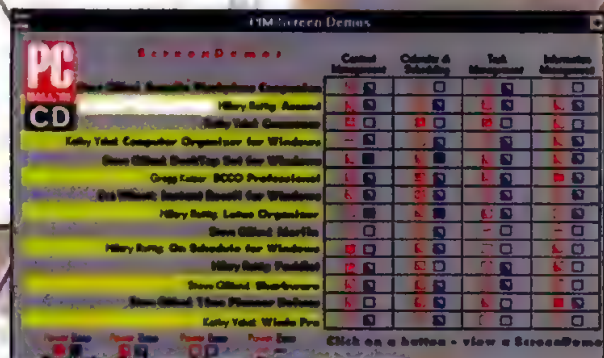


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SUITABILITY TO TASK

Microsoft Schedule+

	Power	Ease
Contact management	Fair	Good
Calendar and scheduling	Good	Excellent
Task management	Good	Good
Information management	Poor	Good
Workgroup	Good	Excellent
Remote	Fair	Fair

remote data handling by synchronizing two calendars during file importing, as well as exporting scheduling information and more to a Timex Data Link watch. But Schedule+ really meets only the simplest information and contact-management demands, so it integrates minimally with Microsoft Office. Yet its integrated design and effective use of graphics just might fulfill some people's needs.—**NHK**

Microsoft Schedule+ for Windows 95. Estimated street price: \$99.95. Requires: 386-based PC or better, 8MB RAM, 6MB hard disk space, Microsoft Windows 95 or Windows NT. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-635-6100; <http://www.microsoft.com>. Circle 461 on reader service card.

Now Software Inc.

Now Up-to-Date for Windows 95

After making its mark on the Macintosh, Now Software is ready to help Windows users organize busy days and manage contacts with Now Up-to-Date for Windows 95, Version 1.0.1. Its first foray into the competitive PC arena offers a contact-centric focus and a professional Windows 95 look and feel, but it misses some key details and has significant trouble importing large database files.

Like On-Schedule, Now Up-to-Date manages names, addresses, and events in spreadsheet-style lists. To learn more about contacts, you just double-click on them to bring up detailed windows. Now

Up-to-Date has the usual search functions to locate groups or individual records. Notable features include color-coding capabilities that can distinguish records as you wish, keyword fields that let Now Up-to-Date quickly search across its databases, and date and time stamps.

On the other hand, scrolling through more than 2,000 records was slow and clumsy, and the program doesn't perform Boolean searches. Also, Now Up-to-Date won't search for text in note fields. The single phone log schedules calls you want to make *and* handles incoming calls.

CALENDAR COORDINATOR

For scheduling, Now Up-to-Date comes with daily, weekly, monthly, and yearly calendar views, and you can switch to the different calendars by clicking the tabs. As with contacts, you can assign color-codes to events. The program lets you schedule multi-day appointments, and the to-do manager adequately tracks tasks along with their priority and status, but the contact history doesn't show task completion.

To link contacts with events, Now Up-to-Date can associate them as you create activities. But Now Up-to-Date neglects to write in the appointment the way other contact managers—such as Sharkware and On-Schedule—do, so it leaves a blank appointment block on your calendar.

While the manual and packaging tout workgroup features that should be available by the time you read this, they hadn't shipped at presstime. In this upcoming version, Now Up-to-Date promises net-

work record sharing, along with group scheduling, meeting notifications, and remote synchronization.

Now Up-to-Date offers a convenient toolbar that lets you quickly view contact and appointment lists, or launch the main program. To perform merges for letters and mailings, Now Up-to-Date comes with macros that only work with Microsoft Word to import and supply name and address information.

Now Up-to-Date has an attractive, easy-to-use interface. To assist in data entry, the program memorizes frequently typed entries and can complete them for

SUITABILITY TO TASK

Now Up-to-Date for Windows 95

	Power	Ease
Contact management	Good	Good
Calendar and scheduling	Good	Good
Task management	Fair	Good
Information management	Poor	Fair
Workgroup	N/A	N/A
Remote	N/A	N/A

you. In our testing, though, we had problems importing a relatively large comma-delimited test file and eventually had to rely on Now Software's technical support to convert the file into a form that we could use.

While Now Up-to-Date offers a polished Windows interface, the program includes hinderances such as slow importing and lacks the powerful features that would enhance its ease of use. So for now, look to a product such as On-Schedule or GoldMine to better meet your information-manager needs.

—Wayne Kawamoto

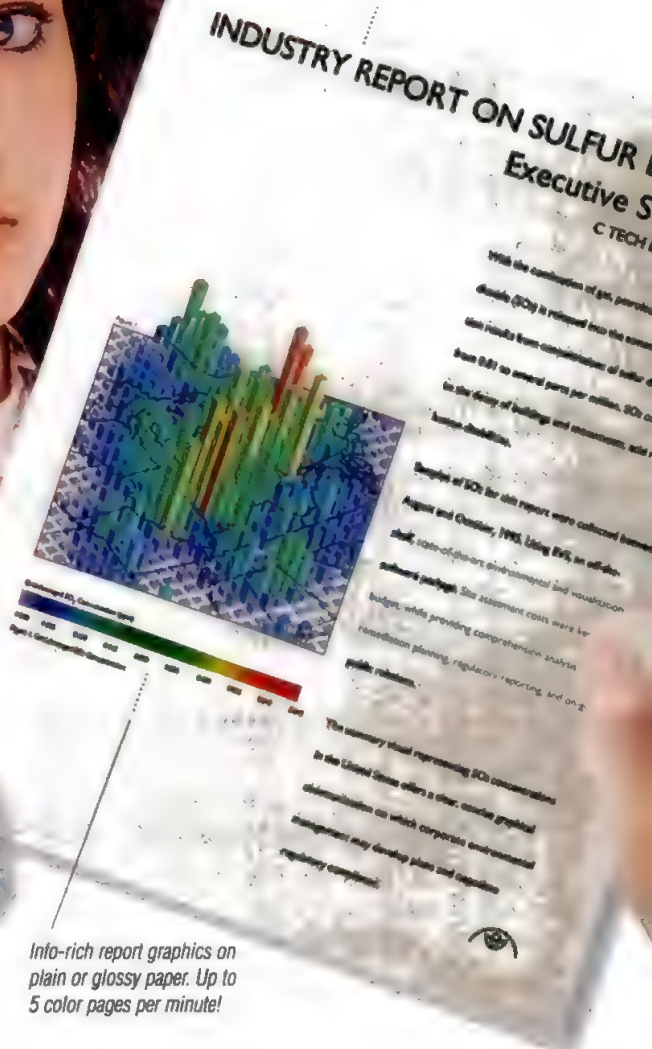
Now Up-to-Date for Windows 95 offers an adequate contact manager with a professional looking interface. It also features the QuickAccess toolbar (inset).



Now Up-to-Date for Windows 95, Version 1.0.1. Estimated street price: \$99. Requires: 386DX-based PC or better, 4MB RAM, 10MB hard disk space, Microsoft Windows 95. Now Software Inc., Portland, OR; 800-722-5963, 503-274-2800; fax, 503-274-0670. <http://www.nowsoft.com>. Circle 462 on reader service card.

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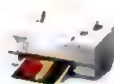
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SUMMARY OF FEATURES

Information Managers

PC MAGAZINE **PC MAGAZINE**
 EDITOR'S CHOICE EDITOR'S CHOICE

■ YES ■ NO	Action Plus 2.0 for Windows	Ascend 5.0	CrossTies 1.0 for Workgroups	Day Runner Planner 1.0	Day-Timer Organizer 2.0	DeskTop Set 5.0 for Windows	ECCO Pro 3.0	GoldMine for Windows 95
Products listed in alphabetical order								
Price	\$395 (list)	\$99 (street)	\$299 (list)	\$75 (list)	\$59 (street)	\$195 (list)	\$139 (list)	\$295 (list)
Native platform	Windows 3.1	Windows 3.1	Windows 3.1	Windows 3.1	Windows 3.1	Windows 3.1	Windows 3.1	Windows 95
Maximum number of available databases	1	1	1	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Default database-file formats	.DBF	Proprietary	Proprietary	Proprietary	Proprietary	Proprietary	Proprietary	.DBF
Can import and export databases	■	■	■	■	■	■	■	■
Supports OLE 2.0 as client/as server	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Allows ODBC access to data	■	■	■	■	■	■	■	■ (no driver supplied)
Calendering/Scheduling								
Adjustable workday/workweek	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Adjustable scheduled time increments	■	■	■	■	■	■	■	■
Prescheduled holidays	■	■	■	■	■	■	■	■
User-defined holidays	■	■	■	■	■	■	■	■
Daily/weekly appointment view	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Monthly/yearly appointment view	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Schedules recurring appointments:								
Daily/Weekly	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Biweekly/Monthly	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Weekday within the month ("the third Friday")	■	■	■	■	■	■	■	■
Finds/graphically displays free time	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Conflict alert/resolution	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Tasks/To-Do Lists								
Assigns priority levels to tasks	■	■	■	■	■	■	■	■
Carries unfinished tasks forward	■	■	■	■	■	■	■	■
Keeps a history of tasks after completion	■	■	■	■	■	■	■	■
Address Book								
Can detect duplicate entries within database	■	■	■	■	■	■	■	■
Maximum number of user-definable fields	Unlimited	6	Unlimited	9	12	32	Unlimited	Unlimited
Searches								
Multiple-field/Boolean searches	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
User can save queries	■	■	■	■	■	■	■	■
Full-text search	■	■	■	■	■	■	■	■
Indexes full text in database for faster searching	■	■	■	■	■	■	■	■
Call Automation								
Phone dialer/Automatic redial	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Smart dialing	■	■	■	■	■	■	■	■
Logs call duration	■	■	■	■	■	■	■	■
Produces reports of time spent with clients	■	■	■	■	■	■	■	■
Supports Windows 95 TAPI phone dialer	■	■	■	■	■	■	■	■
History								
Time- and date-stamps phone calls	■	■	■	■	■	■	■	■
Time- and date-stamps new-contact entries	■	■	■	■	■	■	■	■
User can purge records by date range	■	■	■	■	■	■	■	■
Free-Form Information								
Maximum size of memos or notes	Limited by disk space	Limited by disk space	12K	31K	60K	16K	Limited by disk space	64K
User can search notes entries	■	■	■	■	■	■	■	■
User can organize information in folders	■	■	■	■	■	■	■	■
User can organize information in outlines	■	■	■	■	■	■	■	■
User can create item links or associations	■	■	■	■	■	■	■	■
User can link to external files	■	■	■	■	■	■	■	■
Workgroup Features								
Network version available	■	■	■	■	■	■	■	■
Private and protected entries	■	■	■	N/A*	■	■	■	■

N/A*—Not applicable: The product does not have this feature. N/A**—Not applicable: OS/2 does not support this feature.

SOFTWARE

Information Managers

Continues

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- 15TX Monitor (13.7" v.i.s., 28NII)
- Integrated 3Com EtherLink III
- Integrated Audio
- 3 Year Warranty

\$3671

Product Code #300878



SUMMARY OF FEATURES

Information Managers

■ YES ■ NO

Products listed in alphabetical order

	Action Plus 2.0 for Windows	Ascend 5.0	CrossTies 1.0 for Workgroups	Day Runner Planner 1.0	Day-Timer Organizer 2.0	DeskTop Set 5.0 for Windows	ECCO Pro 2.0	GoldMine for Windows 95
Shared individual calendars	■	■	■	N/A*	■	■	■	■
Can show schedule details/minute free time	■	■	■	N/A*	■	■	■	■
Sends meeting requests	■	■	■	N/A*	■	■	■	■
User can assign tasks to others	■	■	■	N/A*	■	■	■	■
Mail via MAPI/Lotus's cc:Mail/Lotus Notes	■	■	■	■	■	■	■	■
Remote Database Synchronization								
Bidirectional synchronization	■	N/A*	■	N/A*	■	N/A*	■	■
Synchronizes changes at record/field level	■	N/A*	■	N/A*	■	N/A*	■	■
Full database replication	■	N/A*	■	N/A*	■	N/A*	■	■
Synchronizes database via:								
Floppy disk	■	N/A*	■	N/A*	■	N/A*	■	■
E-mail	■	N/A*	■	N/A*	■	N/A*	■	■
Remote network log-in	■	N/A*	■	N/A*	■	N/A*	■	■
Reports and Utilities								
Number of predefined reports	31	18	20	13	17	25	23	65
Reports fit standard paper planners	■	■	■	■	■	■	■	■
Expense tracker	■	■	■	■	■	■	■	■

N/A*—Not applicable: This product does not have this feature. N/A**—Not applicable: OS/2 does not support this feature.

Odyssey Computing Inc.

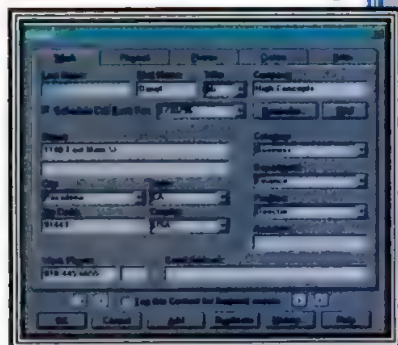
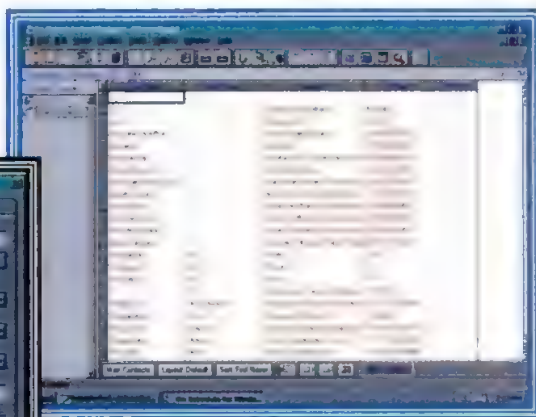
On-Schedule for Windows

While many programs in this evaluation have slick and colorful interfaces, Odyssey's \$99.95 On-Schedule 2.1 for Windows organizes in a staid, businesslike manner. This product won't win awards for good looks, but it offers decent contact management capabilities, a consistent interface, refined contact and scheduling

On-Schedule for Windows lets you link contacts and events by dragging and dropping, and organizes the details with tabbed folders (inset).

you can double-click records to view a contact in more detail. On-Schedule can track a generous amount of information—including business and personal data, custom fields, histories, and notes—and organize it in convenient tabbed folders.

You can quickly locate a record in On-Schedule by selecting a field and typing in information (for example, a last name). Then On-Schedule finds the first matching occurrence. For more detailed and flexible searching, you can use a "find"



abilities, and new networking functions. Like ECCO Pro and Now Up-to-Date, On-Schedule displays contact and event information in spreadsheet-style lists, and

function that applies Boolean logic. Adequate scheduling capabilities provide daily, weekly, monthly, and yearly calendar views. You can set to-do priorities, reschedule appointments by dragging and dropping, and convert to-dos into scheduled appointments. The only drawback

SUITABILITY TO TASK

On-Schedule for Windows

	Power	Ease
Contact management	Good	Good
Calendar and scheduling	Good	Good
Task management	Good	Good
Information management	Poor	Good
Workgroup	Poor	Good
Remote	N/A	N/A

here: You select hours from a clumsy graphic clock, and then you must type in the minutes, though you can adjust times in the daily and weekly views.

GET IN THOSE HOOKS

You can drag and drop contacts onto the calendar or to-do toolbar buttons to create new events and link them with contacts, or assign contacts as you create events. There's also a "hook" function that links existing events and contacts together.

On-Schedule's network capabilities let organizations share calendars and appointments. Several users can work with public files and still maintain their own contacts. But the documentation stumbles here—it hardly mentions networking and relies on an inadequate text file to talk you through the installation. On-Schedule lacks any means to synchronize data for mobile users, but Odyssey should have released an add-on to On-Schedule for syn-

InfoCentral 1.1	Info Select 3.0	Janus Contact 95	Lotus Organizer 2.1	Microsoft Schedule+ for Windows 95	Now-Up-to-Date for Windows 95	On-Schedule 2.1 for Windows	Relish 2.2	Sharkware Professional 1.0	Sidekick 95 Deluxe
N/A*	■	■	■	■	N/A*	■	■	■	N/A*
N/A*	■ ■	■ ■	■ ■	■ ■	N/A*	■ ■	■ ■	■ ■	N/A*
N/A*	■	■	■	■	N/A*	■	■	■	N/A*
N/A*	■	■	■	■	N/A*	■	■	■	N/A*
■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
■	N/A*	N/A*	■	■	N/A*	N/A*	■	N/A*	N/A*
■ ■	N/A*	N/A*	■ ■	■ ■	N/A*	N/A*	■ ■	N/A*	N/A*
■	N/A*	N/A*	■	■	N/A*	N/A*	■	N/A*	N/A*
■	N/A*	N/A*	■	■	N/A*	N/A*	■	N/A*	N/A*
■	N/A*	N/A*	■	■	N/A*	N/A*	■	N/A*	N/A*
■	N/A*	N/A*	■	■	N/A*	N/A*	■	N/A*	N/A*
■	N/A*	N/A*	■	■	N/A*	N/A*	■	N/A*	N/A*
16	2	10	51	11	10	18	9	11	6
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■

chronization by the time you read this. On-Schedule also comes with a built-in word processor to handle mail-merges and form letters, and its decent selection of predefined reports will probably cover most of your needs.

INFORMATION, PLAIN AND TALL

Though not as attractive as some other programs, On-Schedule's simple, practical interface does have its advantages: Its spreadsheet format easily lets you add columns to display more data, resize fields, and set text. A toolbar presents the most commonly used functions.

On-Schedule's manual needs to explain some concepts—such as linking—in more detail, and its index hides the hook function and lots of other key features. If you don't need document management, phone logging, or networking capabilities, On-Schedule comes in a lower-priced Express version (\$49).

On-Schedule might lack the flash and panache of GoldMine and other information managers, but it rides the straight and narrow and does it well. If you need no-nonsense contact management without group scheduling and synchronization, consider On-Schedule.—WK

On-Schedule 2.1 for Windows. List price: \$99.95. Requires: 386-based PC or better, 4MB RAM, 6MB hard disk space,

Microsoft Windows 3.1 or later. Odyssey Computing Inc., San Diego, CA; 800-965-7224, 619-675-3660; fax, 619-675-1130; <http://www.odyssey.com>. *Circle 463 on reader service card.*

Sundial Systems Inc.

Relish

Relish 2.2 (\$189) from Sundial Systems is the product whose interface blends best with OS/2; in fact, it's the only native OS/2 product reviewed here. A direct comparison of Relish's features to those of the leading information managers in this roundup bears out the claim that Relish specializes in offering a highly flexible way to share, sift, and store a simple body of information. But while Relish does capitalize ingeniously on the strengths of OS/2, it ultimately does not provide enough strong contact and calendar management.

Relish only supplies four fields for names and addresses, and you can't add fields or redefine any of them. But it's surprisingly efficient at finding contacts in the database. If the phone book is open, just type the name and Relish automatically locates it; you don't have to tell it to search.

Relish's primitive-looking interface also hinders calendar and scheduling

functions. The small monthly calendar shows appointments in a list below the calendar, and Relish presents weekly and daily calendars only as a list. Relish's calendar simply doesn't have the strong visual presentation found in other applications reviewed here.

HOT DOG

Because of the way Relish exploits OS/2, it offers unusual flexibility in task management. In Relish, you can easily include contact information in a to-do item because all contact information is available for reference in the to-do dialog box. Just put the cursor in the box where you want contact information, and Relish finds it.

SUITABILITY TO TASK

	Power	Ease
Contact management	Fair	Fair
Calendar and scheduling	Fair	Fair
Task management	Fair	Good
Information management	Fair	Fair
Workgroup	Good	Fair
Remote	Good	Fair

You can also attach free-form notes or launch another application. Relish doesn't offer any history logs, but completed tasks remain available for viewing.

Relish's most unique and compelling feature is its method of managing and pre-

senting your accumulated information in units called *buns*, OS/2 Workplace Shell objects that reflect independent instances of the Relish database. You can preconfigure buns to present your information in whatever arrangement you find most useful, create an unlimited number of buns and keep them available as icons on your desktop, group your phone contacts in different buns which correspond to different projects or clients, or drag and drop contact information from a phone book bun into a calendar bun to connect information. Buns don't actually contain data; they simply reflect a portion of the database the way you've chosen to see it.

Both workgroup functionality and remote access rely on some unusual communication methods in the network version, Relish Net. Rather than requiring all users to map to a common drive to access the database, Relish Net uses the Named Pipes protocol for messaging between Relish clients. Each time a user joins the network, Relish automatically updates relevant portions of the database to that user's machine.

Relish's monthly calendar is primarily a navigation device. The address book (inset) in Relish only has four fields, which can't be renamed or rearranged.

The user may then disconnect from the network after Relish has updated the data. Synchronization and workgroup data sharing occurs for all users, including laptop and peer-to-peer clients.

If you need power-

ful contact management, Relish can't provide it. Neither will it convince you to switch to OS/2 if you're not convinced already. But for OS/2 users, Relish integrates nicely.—BD

Relish 2.2. List price: \$189. Requires: 386-based PC or better, 4MB RAM, 2MB

hard disk space, OS/2 2.1 or later. Sundial Systems Inc., Seal Beach, CA; 310-596-5121; fax, 310-598-9851. *Circle 464 on reader service card.*

CogniTech Corp.

Sharkware Professional

If you're drowning in appointments, phone calls, and tasks, CogniTech's \$199.95 Sharkware Professional 1.0 might keep your head above water. Sharkware does a good job of scheduling tasks, maintaining histories, and tracking lots of information. It also packs in knock-'em-dead salesmanship from author and business guru Harvey Mackay.

As with any contact-centric information manager, Sharkware excels at managing names, addresses, telephone numbers, and information on clients and customers. Each record features folders that organize histories, home and office info, comprehensive notes (with corresponding searches), follow-up phone calls, and sales proposals. At a glance, Sharkware places all contact information within immediate reach on one screen, unlike the lists that Now Up-to-Date and On-Schedule display. There's also the Mackay 66 folder, which tracks the personal customer information that

Mackay says helps to build business and close sales.

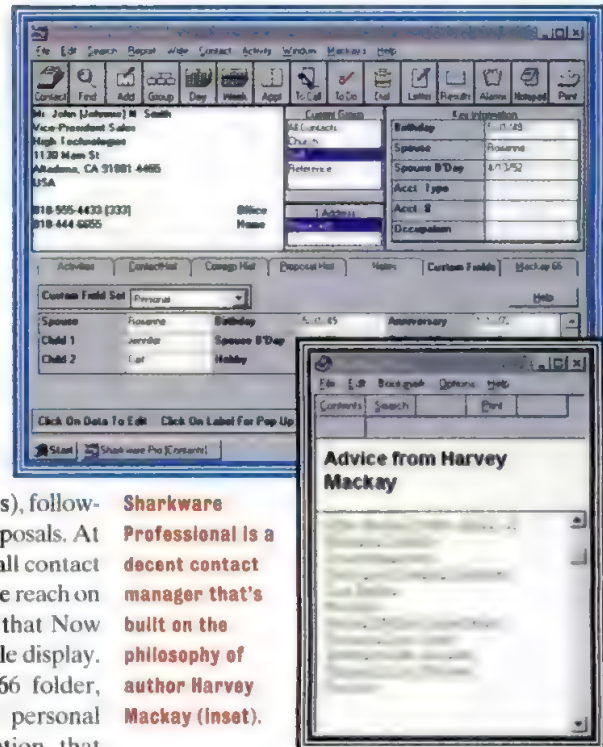
ATTACK IN GROUPS

Sharkware's strongest suit is its ability to group contacts together. You can organize contacts into groups, and view and work with these groups to set appointments or send letters. In fact, groups can share common custom fields, although Sharkware doesn't take the extra step to place contacts under single organizations. Furthermore, it lets you create unlimited custom fields and offers first-rate search

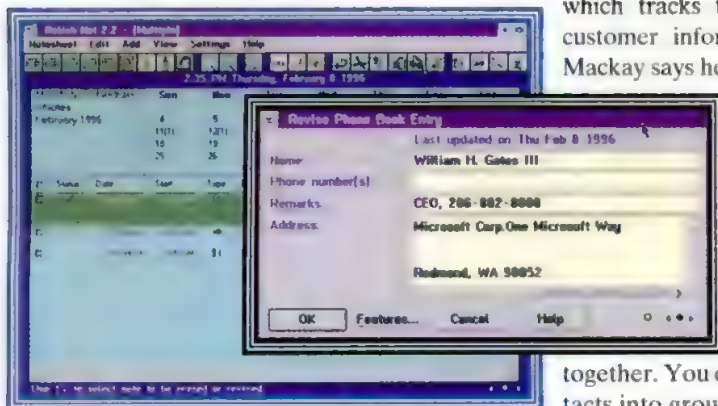
capabilities that can apply Boolean logic.

Calendaring and scheduling features are average, and the graphic on-screen calendar—which consists of only daily and weekly views—lets you easily create events and associate them with contacts. After you complete your many tasks, Sharkware displays them in the appropriate contact's history. The program also comes with alarms and on-screen reminders, and it does a good job of tracking to-dos and assigning priorities.

If you need network capabilities, the



Sharkware Professional is a decent contact manager that's built on the philosophy of author Harvey Mackay (inset).



ful contact management, Relish can't provide it. Neither will it convince you to switch to OS/2 if you're not convinced already. But for OS/2 users, Relish integrates nicely.—BD

Sharkware Professional Network version (\$495), which includes the Watcom database, lets users share data files. During our installation and testing, we found that the network program was fairly straightforward to install and ran relatively trouble-free. Missing in this network version are any workgroup features that could help you arrange meetings or make assignments, and any synchronization features to support road warriors. (By the time you read this, Version 2.0 will be available and will contain synchronization features.) But you can link files from within Sharkware's notes fields and launch them with a double-click. The program also uses macros to merge data easily with Ami Pro, Microsoft Word, and WordPerfect.

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CIRCLE 065 ON READER SERVICE CARD

ALL TEETH

Sharkware's interface is quite usable but visually stark with its simple layout of buttons, folders, and a toolbar. Importing databases is straightforward, although Sharkware asks in advance for

SUITABILITY TO TASK		
Sharkware Professional		
	Power	Ease
Contact management	Excellent	Good
Calendar and scheduling	Good	Good
Task management	Good	Good
Information management	Good	Good
Workgroup	Fair	Good
Remote	N/A	N/A

the number of fields in a record, an extra step that you probably won't already know.

Sharkware also includes optional daily pop-up tips based on Mackay's helpful sales philosophy. So even though Sharkware lacks group scheduling and synchronization, it can help you or your organization net new business and manage your sea of disorganization.—WK

Sharkware Professional 1.0. List price: \$199.95. Requires: 386-based PC or better, 4MB RAM, 12MB hard disk space, Microsoft Windows 3.1 or later. CogniTech Corp., Atlanta, GA; 800-947-5075, 770-518-4577; fax, 770-518-4588. *Circle 465 on reader service card.*

Starfish Software

Sidekick 95 Deluxe

Just as every movie hero relies on a trusty sidekick, Starfish Software's \$79.95 Sidekick 95 Deluxe stands ready to serve; it's an attractive information manager with its own brand of organizational tools that does the job with style, flexibility, and ease. But while Sidekick tracks the requisite names, addresses, and telephone numbers, these features lack the power found in more contact-centric prod-

SUITABILITY TO TASK		
Sidekick 95 Deluxe		
	Power	Ease
Contact management	Good	Fair
Calendar and scheduling	Good	Excellent
Task management	Fair	Good
Information management	Good	Good
Workgroup	N/A	N/A
Remote	N/A	N/A

ucts such as GoldMine or Sharkware Professional. As in past versions, Sidekick manages names and addresses in a simple address-book format, and it performs the usual searches.

CONTACT MANAGEMENT ON THE SIDE

Sidekick offers a function that displays activities, links, and histories, and while this adds new-found contact management capabilities, it muddles a formerly clean approach and may confuse users. For example, you may forget that displayed appointments don't necessarily relate to your displayed contact. If you want to see the true contact information, you have to take an extra step to access the contact function.

For scheduling and managing tasks, Sidekick does an excellent job of creating and tracking appointments, calls, and to-dos, and provides daily, weekly, monthly, and yearly calendar views. Throughout, Sidekick makes good use of dragging and dropping to create and rearrange appointments, and it includes on-screen reminders and alarms. An integrated to-do list manages the daily and unfinished tasks.

GOING IT ALONE

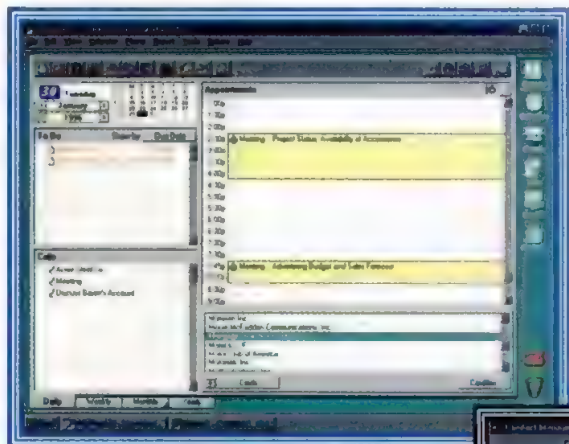
For now, Sidekick Deluxe offers no network or workgroup features, although at press time Starfish had announced an upcoming workgroup version that will use Internet e-mail as an infrastructure for group scheduling. For limited synchronization, the current version of Sidekick can update new appointments from one database into another, but this one-way communication doesn't transfer new contacts.

Sidekick's Write module (formerly Notes) does a great job of managing random information and organizing it in folders. Sidekick later locates it by searching for text strings. Though not as slick as the information management in

InfoSelect, it's nonetheless first-rate and intuitive. Write also serves as Sidekick's built-in word processor, which you can use to create form letters with pre-defined text and then merge contact data. Sidekick offers no support of external word processors.

The CD-ROM edition of Sidekick Deluxe comes with instructional videos, Dashboard (a slick graphical control panel for Windows 95), and a link to America Online. But if you run into any problems with the software (we didn't), Starfish Software charges dearly for technical support: Although any help with installation is free, the company charges two bucks a minute for any support thereafter.

Ultimately, Sidekick's highly customizable interface, easy-to-use func-



Sidekick 95 Deluxe offers a flexible, slick, and intuitive interface, and performs contact management through a dedicated function (inset).



tions, and looks that rival Lotus Organizer's make it stand out. Undoubtedly, stronger programs do exist for managing contacts, but if you're looking for an information manager without remote access but with flexibility, good looks, and great features, Sidekick is the digital Tonto for you Lone Rangers.—WK

Sidekick 95 Deluxe. Estimated street price: \$79.95. Requires: 486-based PC or better, 8MB RAM, 10MB hard disk space, Microsoft Windows 95. Starfish Software, Scotts Valley, CA; 800-765-7839, 408-439-0942; fax, 408-461-5900; <http://www.starfishsoftware.com>. *Circle 466 on reader service card.*

PC Tech

THE DEFINITIVE GUIDE TO PC TECHNOLOGIES & TOOLS

The Netscape Security Breach

Navigator's encryption scheme gets broken: What do we learn?

By Jeff Proise



One of the hottest stories in the computer industry in 1995 was the announcement that the security of Netscape Navigator, the world's most widely used Web browser, had been broken. This was August, and it turned out the break was more sensationalism—or perhaps misunderstanding—than anything else. But the next month delivered news of a genuine Netscape security breach, and this time I was all ears.

Unfortunately, the mainstream media didn't relate many of the details, so I was forced to look elsewhere to learn what really happened. Much of what I found came from the World Wide Web itself. The story that unfolded was far more interesting than anything I had read in either the general news media or the computer press. It also offered some valuable lessons in data security that anyone interested in doing business on the Internet would do well to heed.

In this column, I'd like to share those lessons with you. Should you trust the Internet and your browser software to handle credit card numbers and other sensitive data safely? Read on.

SECURE SOCKETS LAYER

The basis for secure transactions in Netscape Navigator is a protocol called the *Secure Sockets Layer*, or SSL. When you surf the Web with a browser such as Netscape Navigator, the browser communicates with the Web servers you connect to using a language called hypertext transport protocol (HTTP). To download an HTML (hypertext markup language) file representing a Web page, for example, the browser sends an HTTP GET command to the server and the server responds by transmitting the file's contents to the browser. The text of the GET command and the text of the HTML file are sent and received through connections called *sockets*, which enable two remote computers to talk to each other via the Internet.

Netscape invented SSL to address a fundamental security concern involving information transferred over the Web. Because the Web itself does not encrypt or disguise the data sent across it, someone who intercepts a Web transmission has complete access to the information contained therein. Information can be valuable, especially if it contains credit card numbers, PIN numbers for teller machines, or other sensitive data. The Internet can become a platform for

large-scale commerce only if it's possible to conduct busi-

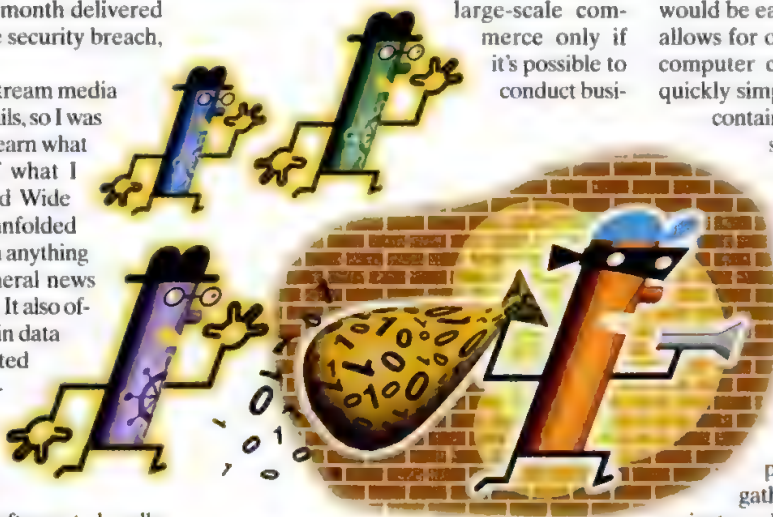
a legendary figure in the cryptography community and one of the developers of the widely used RSA public-key algorithm. RC4 is generally believed to be secure, although the exact details of the algorithm are guarded and have not been subjected to independent scrutiny.

Assuming the algorithm is secure, the difficulty of cracking an encrypted SSL message is a function of the key length. If the encryption key is only 8 bits long, for example, messages would be easily decipherable because 8 bits allows for only 28, or 256, possible keys. A computer could arrive at a solution very quickly simply by trying all 256 keys. A key containing 100 bits, however, would present a formidable obstacle. With 2^{100} different combinations of 1s and 0s to try against the encrypted message, a supercomputer capable of testing 1 million keys per second would require centuries—no, eons—to find the right one.

The encryption key that Netscape Navigator uses to encode SSL transmissions is generated automatically on a per-session basis from information gathered at runtime. Versions of Navigator sold in the United States use 128-bit keys that, at least in theory, are virtually impenetrable. (For more on Internet security methods, see this issue's Internet Tools column.) Versions of Navigator sold outside the U.S. use 40-bit keys, however, because that's the maximum permitted by tough U.S. laws that equate the export of encryption software with the sale of munitions to foreign governments. The U.S. government can crack a code encrypted with a 40-bit key in a matter of days or even hours.

THE SSL CHALLENGE

On July 14, 1995, an American computer user named Hal Finney posted what came to be known as the "SSL Challenge" on the Internet. The post included the binary transcript of an SSL transaction encrypted by Netscape Navigator using a 40-bit key. Mr. Finney's challenge: Crack the code and report back to him the fic-



ness transactions with complete privacy. If a transmission falls into the wrong hands, the information it contains—a credit card number, for example—should be unreadable to anyone other than the sender and receiver.

SSL solves this problem by encrypting HTTP transmissions. For those familiar with the seven-layer ISO/OSI networking model and its relationship to TCP/IP stacks: SSL fits in between HTTP in the application layer and the TCP/IP protocols in the network and transport layers. Data is automatically encrypted before it is transmitted and then unencrypted on the receiving end. In between, it is a meaningless jumble of 1s and 0s to anyone who lacks the special key required to decrypt it.

The security of SSL hinges on how difficult it is to unlock an encrypted message without the key. SSL relies on RC4, a well-known block-encryption algorithm invented by Ron Rivest,

titious name and address included in the encrypted binary message.

The challenge didn't go unanswered for long. On August 15, a French doctoral student named Damien Doligez posted the answer. He had used 120 workstations and two supercomputers to crack the code with a brute-force approach that basically involved guessing a key, trying it against the encrypted message, and guessing again if it didn't work. Eight days and more than 500 billion keys later, he happened across the correct key. Word of his solution spread rapidly across the Internet and soon to the major wire services. Later it was learned that a trio of American researchers had arrived at the solution about 2 hours before Doligez. But it was Doligez who made news, and the media uproar that ensued prompted Netscape to issue an official response on August 17.

In its response, Netscape acknowledged Doligez's achievement but refuted the importance of it. The company pointed out (quite correctly) that the 40-bit key length was the key to the success of the brute-force attack and that the 128-bit encryption keys used in U.S. versions of Navigator were "practically impossible" to decrypt with current or "foreseeable computer technology." Netscape also calculated the worth of the computer time required to break the code—by their estimates about \$10,000—and went on to say this:

RC4 40-bit is strong enough to protect consumer-level credit-card transactions—since the cost of decrypting the message is sufficiently high to make it not worth the computer time required to do so—and that our customers should use higher levels of security, particularly RC4 128-bit, whenever possible.

This level of security has been available in the U.S. versions of our products since last April. Because of export controls it has not been available outside the U.S. We would appreciate your support in lobbying the U.S. government to lift the export controls on encryption. . . . Finally, we'd like to reiterate that all [Doligez] has done is decrypt one single RC4 40-bit message. RC4 the algorithm and products which use the algorithm remain secure as always.

The gist of what Netscape said was correct. Doligez's successful attack wasn't an indictment of the RC4 algorithm but an indication of the weakness of 40-bit keys. The key length is something Netscape had no control over, and U.S. users could feel secure because their software used 128-bit encryption keys. What Doligez had really done was to refute the U.S. government's assertion that 40-bit keys are strong enough to allow U.S. companies that deal in encryption technology to be competitive overseas. Clearly they are not—not when a private citizen (albeit one with access to an unusu-

al amount of computing resources) can break a 40-bit RC4-encrypted message in little more than a week.

THE BACK DOOR

There's an old saying that a chain is only as strong as its weakest link. Up to this point, all the attacks on Navigator's SSL code had relied on brute force. What Netscape hadn't counted on was SSL's susceptibility to attacks by methods other than brute force.

On September 17, Ian Goldberg and David Wagner, a pair of first-year graduate students at U.C. Berkeley, published a method for decrypting SSL data that requires at most a few



You never know with absolute certainty that an encryption algorithm is secure; you can only be sure it's not secure.

hours on a single workstation. Astonishingly, their method works equally well with 40- and 128-bit keys. Whereas the brute-force attack on SSL that Doligez engineered was, more than anything else, a demonstration of the power of parallel processing, the Goldberg/Wagner attack documented a bona fide security breach—and an extremely serious one at that. Here's what Goldberg and Wagner found and how they turned a chink in Navigator's armor into a hole that, as one analyst put it, "you could drive a truck through."

A message that is RC4-encrypted with a 128-bit key is considered to be unbreakable because of the sheer number of attempts needed to guess the key by trial and error. Although 128 bits may not sound all that big, 2 raised to the 128th power is a big number, even for a supercomputer. But the effectiveness of the key length is reduced if the key is not truly random. Think of it this way: Someone tells you that you can encrypt a message with a 128-bit key but then says, "Oh, by the way—there are only 256 key values that I'll allow you to use." The actual key length is now meaningless, because the effective key length has just been reduced to 8 bits.

It turns out that when Navigator generated the SSL encryption key, it severely limited the number of values the key could take on. The problem was one of randomness, which is always an elusive quality on a computer because computers are designed to be very unrandom. Computers are incapable of generating truly random numbers, but programmers have come up with all kinds of ways to simulate them. Of course, some methods are better than others.

Goldberg and Wagner reverse-engineered the key-generator code in Navigator—they found that the key was derived from a "random" number that was in turn derived from some fairly predictable quantities such as the program's process ID and the current time of day. With this knowledge and some clever detective work, they were able to narrow the range of keys they tested. They cracked some messages in seconds and calculated that, at best, Navigator's 128-bit keys offered only 47 bits of security. In an excellent article in *Dr. Dobbs's Journal* ("Randomness and the Netscape Browser," January 1996), Goldberg and Wagner pre-

sented the details of their attack and concluded that "even a remote attacker [could] break Netscape's [128-bit] encryption in a matter of minutes."

The news took the industry by storm. The implications were enormous; at a time when the online community was just beginning to come to grips with the myriad security issues surround-

ing digital transactions, the security mechanism used by the world's most popular Web browser had been blown away. Within days, Netscape acknowledged the problem and scrambled to revise Navigator's key-generation code to make it more "random" and less susceptible to attacks that don't require brute force. The new key-generation code has been made public so experts around the world can scrutinize it.

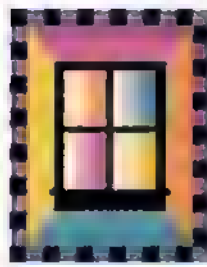
LESSONS LEARNED

At least two important lessons can be learned from the Netscape security breach. The first is that any encryption scheme is only as strong as its weakest link. In Navigator's case, the encryption algorithm was sound but the key-generation algorithm was not. The second is that obscurity does not equal security. You cannot rely on the secrecy of an algorithm to provide security, because someone can always disassemble your code.

What Goldberg and Wagner did was an important lesson for all of us. An algorithm is considered "secure" only when its details are published for all to see and it stands up to years of determined attacks by expert cryptographers.

Ironically, you never know with absolute certainty that an encryption algorithm is secure; you can only be sure it's *not* secure, and that happens when someone breaks it. It's a mistake to trust sensitive electronic data to software whose authors say it's secure but won't subject it to rigorous and public testing. Be skeptical and insist on full disclosure. □

Jeff Prosise is a contributing editor of PC Magazine.



PC Tech/Inside Windows 95

By Richard Hale Shaw

Writing OLE Automation Clients and Servers

Creating an Automation server and client using VC++ and VB.

Our last Windows column (February 6, 1996) covered OLE Automation clients and servers and how they differ from traditional OLE object containers and servers. In this installment, we'll see how to write a simple in-process OLE Automation server in Visual C++ and an Automation client to that server using Visual Basic.

You can, of course, reverse the roles of these tools. Visual Basic has offered Automation client facilities since Version 3.0, and Version 4 now offers Automation server features. (Indeed, VB4 *had* to support the creation of Automation servers, not so you could use it to create Automation servers per se, but so it could be a container of OLE controls.) VC++, on the other hand, has offered the ability to create both Automation clients and servers since Version 1.5. But a typical Automation server should offer its services quickly and with relatively little overhead, while an Automation client should be relatively easy to put together and create. Thus, given the particular facilities of each tool—VC++'s ability to create native-code in-process Automation servers (ones that reside in a DLL and thus in the address space of the calling process) and VB's ability to easily create Automation clients—it seems only natural to use each in its most appropriate role.

To make things interesting, I wrote a simple in-process Automation server with VC++ 4.0 that provides random number generation as a service. When the server is loaded, it initializes the C/C++ library random number generator using the current system time as a seed. An Automation client can then call methods in the server to retrieve a new random number or initialize a buffer full of new random numbers (the client specifies how many). The client can also give the server a window handle so that the server can stuff a random number into the client window's caption text, or the client can let the server stuff new random numbers into another client window every second (the client can start and stop this action in the server). Finally, the client can supply its own random number seed in the server to initialize the random number generator.

I then wrote an Automation client in VB4 that displays a form for exercising these features in the server (Figure 1). The client can

retrieve a random number from the server into a list box (adding each new number to the bottom of the list box), get the server to stuff a random number into one of its edit boxes, and get the server to stuff a new random number into another edit box every second. Both the server and client software are available for

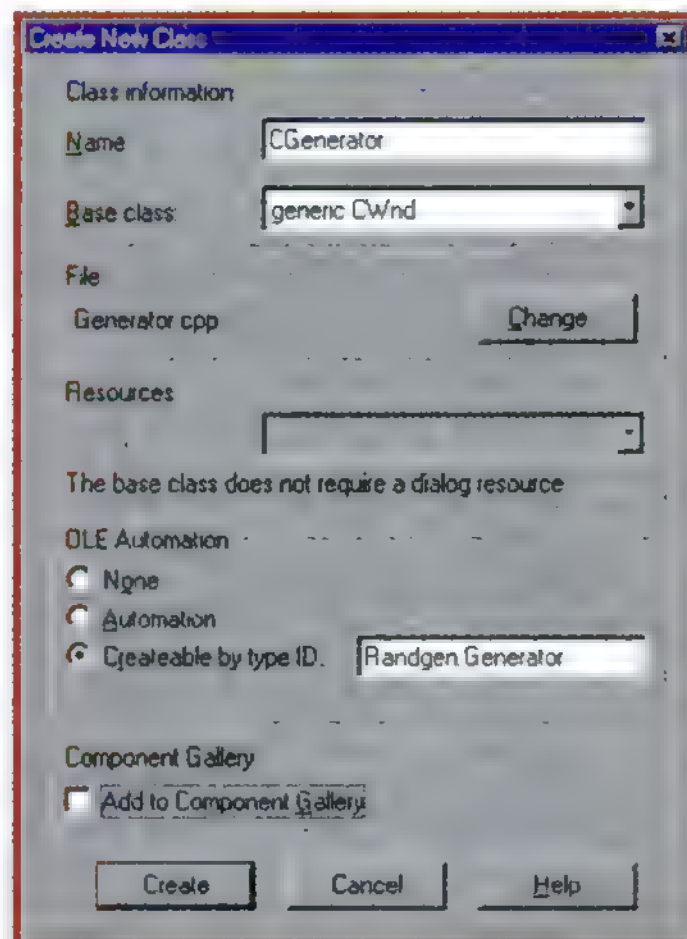


FIGURE 1: The VB4 Automation Client lets you exercise features in the in-process VC++4 Automation server.

downloading from PC Magazine Online (RANDGE.ZIP).

In the discussion that follows, we'll start with the simpler task—how to build the Automation client in VB4—and then go on to describe how the server was implemented in VC4.

THE AUTOMATION CLIENT

Visual Basic first featured Automation client capabilities in Version 3.0, and it cleverly hides the details of connecting to a server, making the process relatively simple and straightforward. Most of what's entailed in creating an Automation client with VB involves three steps:

- Create a variable to represent an Automation server object in the Visual Basic program.
- Initialize that variable and invoke the server to create an instance of the Automation object to which you want to connect.

- Access the Automation object's properties and methods using the variable.

In my VB Automation client, I added the first two right away; using the server's properties and methods came later. For example, I wanted to be able to use the Automation server throughout the client, so I put the declaration of the server object variable in the "(general) (declarations)" section of the program:

```
Dim RandGen As Object
```

The syntax declares RandGen as a variable of type Object in VB, where an Object variable can represent an Automation object in a server.

To initialize the object, I used the syntax:

```
Set RandGen = CreateObject  
("Randgen.Generator")
```

The CreateObject function in VB lets you create an instance of an Automation server object. You pass to it the object's programmatic ID: the name of the object as it will be known in the System Registry. You may recall from the second column in this series ("OLE's Component Object Model," November 21, 1995) that the programmatic ID of an OLE object will contain the globally unique ID, or GUID, of the object's server. OLE can use the GUID to look up the server's entry in the Registry, find the path to the server there, and then invoke that server. So calling CreateObject causes OLE first to find the Registry entry containing the programmatic ID, then to use the GUID there to look up the server location, and then to invoke the server to create an instance of that object. Once it's finished, CreateObject will return a pointer to the object's IDispatch interface—remember that IDispatch is the key OLE interface for supporting Automation ("Custom Interfaces, Customizable Objects," February 6, 1996). With the IDispatch pointer stored in the variable, RandGen, the VB program can now invoke its properties and methods.

Note that if something goes wrong—the server isn't found, isn't registered, has been moved, crashes during initialization, can't create an object, and so on—CreateObject will generate an error message that VB will display in a message box. So you'll know right

away if the server fails to create the appropriate object.

Since I planned to use this Automation object the entire time the client's form is displayed, I added the line of code above to the client's `Form_Load`, a VB procedure that corresponds to the handling of a `WM_INITDIALOG` message in Windows (or an `OnInitDialog` override in VC++/MFC). Once the server object has been created, it will continue to run until Visual Basic unloads it. VB will discard the server object automatically when the server object variable goes out of scope. Since this particular server variable was declared globally in the program, the server object will stick around until the VB program terminates. But I could have deliberately discarded the server object using the syntax:

```
Set RandGen = Nothing
```

The "Nothing" keyword in VB is essential here.

Note that this step doesn't necessarily unload the server: It simply discards the server object and decrements a reference count on that type of object in the server's class factory for that object. Here's why.

You may recall that OLE requires each server to create a class factory for each type of OLE object supported by that server. Class factories create (or manufacture) instances of that particular type of object for that server and maintain a reference count of the number of objects created. By serving more than one server object at a time, a single server instance can support multiple clients at a time (one client per server object). Thus, each client can be served by a separate server instance, or a single server instance can service multiple clients.

If each client is served by a separate instance of a server, discarding a server object will unload the server. But what if a single server instance is serving multiple clients? In that case, when a client unloads an object, the object's class factory will decrement its reference count: The class factory increments the reference count every time it creates a new object and decrements it when the object is discarded. Thus, the reference count always represents the number of server objects of that type that exist at any point in time. The server will be unloaded only when all of a server's class factory's reference counts go to zero (meaning that the server is not serving some type of OLE object).

USING THE PROPERTIES AND METHODS

Once you've instantiated and initialized a server object, you can access its properties and methods. For instance, I added a button, `Command1`, and a list box, `List1`, to the form of the Visual Basic program and then added

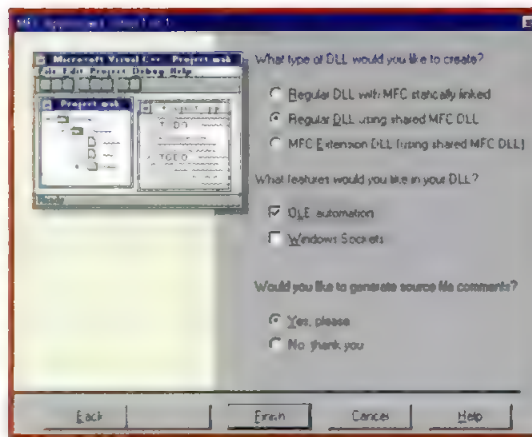


FIGURE 2: The Visual C++ 4.0 New Project Workspace dialog lets you specify the name of a new project and its initial settings.

the following code to be executed when `Command1` was pushed:

```
Private Sub Command1_Click()  
    temp = "0123456789"  
    RSet temp = Str(RandGen.  
        ➔GetNumber())  
    List1.AddItem temp  
    If (List1.NewIndex > 11) Then  
        List1.TopIndex = List1.  
            ➔NewIndex - 11  
    Else  
        List1.TopIndex = 0  
    End If  
End Sub
```

This code initializes a local variable, `temp`, calls the server's `GetNumber` method to retrieve the next random number, and then adds the variable to the `List1` list box. The syntax for invoking the `GetNumber` method in the server is:

```
RandGen.GetNumber()
```

where `RandGen` is the name of the server variable that was initialized earlier and `GetNumber` is the name of the method. You access methods and properties of Automation servers the same way you do ordinary object properties and methods in a language like Visual Basic. The `VB Str` function converts the integer result to a string and stuffs it into the local variable, `temp`; the `RSet` statement ensures that the resulting string is right-justified inside the variable. The following line simply adds the contents of the variable as a new item to the list box:

```
List1.AddItem temp
```

The rest of the procedure simply adjusts the position of the list box so that the latest entry is always visible.

I then added two buttons and an edit box to

the form, with the idea of using two other methods in the Automation server: `StartGenerating` and `StopGenerating`. The `StartGenerating` method takes as a parameter a handle to a window or edit box and starts a timer in the server. The server will save the window handle, create a timer, and—whenever the server gets a timer message—stuff a newly generated random number into the window's title bar (or an edit control's contents). To start this activity, the user can push the `Command2` button, which invokes:

```
Private Sub Command2_Click()  
    RandGen.StartGenerating  
        ➔(Text2.hWnd)  
End Sub
```

Note that this code passes the window handle of an edit box, `Text2`, as a parameter to the server's `StartGenerating` method. (You don't have to pass a window handle to get the updated data: Instead, you can implement an Automation interface in the client and have the server post notifications back to the client through that interface. This is also the approach used by OLE controls.) Using this window handle, the server will continue to generate new random numbers on a periodic basis and stuff them into the edit box until the client calls `StopGenerating`:

```
Private Sub Command4_Click()  
    RandGen.StopGenerating  
End Sub
```

By default, the server I've supplied here will generate random numbers every second (or, in timer lingo, every 1,000 milliseconds). But this server exposes the timer interval as a property you can set from an Automation client. To take advantage of this, I added another edit box, `Text3`, that is initialized to the server's `TimerInterval` property value when the server is first loaded:

```
Text3.Text = Str(RandGen.  
    ➔TimerInterval)
```

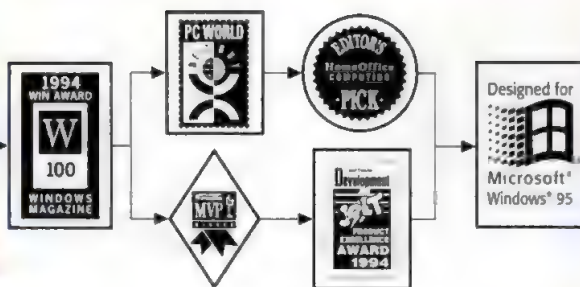
The user can alter this value by simply typing in the edit box: The Change handler for `Text3`—called whenever the user edits the contents of `Text3`—will change the server's property accordingly. After screening out values less than 1 and greater than 32,000, `Text3_Change` will reset the timer interval in the server to the value the user has typed into the edit box by calling:

```
RandGen.TimerInterval =  
    ➔Abs(Val(Text3.Text))
```

If you run the program yourself, you'll see that after changing the timer interval, you



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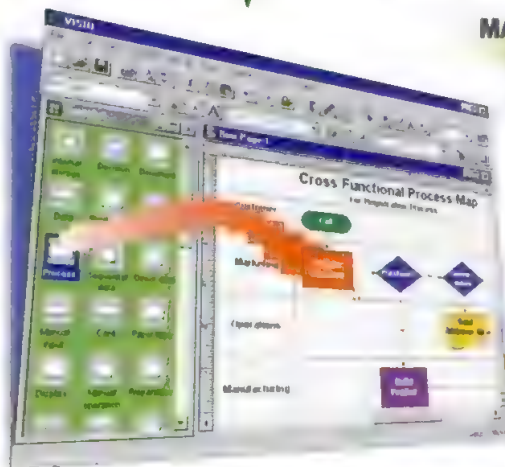
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must restart the timer by first pressing the Stop button and then the Start button. The server does not restart the timer when you reset the timer interval.

BUILDING A VC++ AUTOMATION SERVER

While Visual Basic requires only a few lines of code to implement an Automation client, Visual C++—using the Microsoft Foundation Classes (MFC)—requires considerably more. Fortunately, tools like AppWizard and ClassWizard mean most of the work is done via point-and-click, and you need to write only a few lines of code to get a server up and running.

As noted, this will be an in-proc Automation server: one that runs in the address space of the Automation client process and is therefore implemented as a DLL. Visual C++ 4.0 makes creating an in-proc Automation server easy by letting you generate the code for a shell DLL. You can then add an Automation object interface—with properties and methods—to complete the server implementation.

To begin, I started Visual C++ 4.0 and selected File | New to invoke the New Project Workspace dialog. I then selected “MFC AppWizard (dll)” (Figure 2) and specified the project name and directory location. While VC4 lets you use long filenames for project and source files, I dubbed mine RandGen so that the resulting server would be RANDGEN.DLL.

Pressing the Create button invokes AppWizard, which requires only a single step for a DLL project: You specify the type of DLL to be created and whether it should have OLE Automation support (Figure 3). I selected “Regular DLL using shared MFC DLL.” A “regular DLL” is one that any Windows application, not just an MFC application, can use. I could have chosen “Regular DLL with MFC statically linked,” making it much larger. Selecting “shared MFC DLL” means I’ll have to distribute MFC40.DLL with my server, but it also means the server itself will remain relatively small (the final size was 13K). The remaining option is one that can’t be used with an Automation Server DLL: “Extension DLL (using shared MFC DLL)” is for creating a DLL containing MFC derivative classes that are to be used by an MFC application—and only an MFC application.

The only other option I chose was OLE Automation, which adds some code required to create an Automation server. With these selections made, I pressed Finish to generate the

project and the code. What we now have is a generic in-proc Automation server: All that’s left is to define and implement an Automation object with its methods and properties.

EXAMINING THE GENERATED CODE

We now have the shell of an Automation server—but there’s no Automation object in the DLL code yet. AppWizard generated a single MFC class, CRandGenApp, which is derived from MFC’s CWinApp class. Every MFC EXE or DLL has to have a CWinApp-derivative in it, and this one includes an override of the CWinApp::InitInstance function, a virtual function that’s invoked automatically by MFC whenever the EXE or DLL is first invoked. (In the case of MFC EXEs, CWinApp::

And since InitInstance is called from the in-proc server’s DllMain function (when the DLL is first loaded), the class factories are ready at the outset to manufacture instances of the server’s objects.

Because we selected the Automation option in AppWizard, three additional functions were generated: DllGetClassObject, DllCanUnloadNow, and DllRegisterServer. All three are STDAPI functions; that is, they use the standard Windows API calling convention, are not members of any C++ class, and can be invoked from any Windows program (just like any Windows API function).

The first two functions make it possible to support the OLE Component Object Model from an in-proc server. For example, an OLE client (or container) can create an instance of a server object by calling the OLE API function, CoCreateInstance. This function in turn calls CoGetClassObject to get a pointer to the IUnknown of the object’s class factory and then calls IClassFactory::CreateInstance via that interface pointer. IClassFactory::CreateInstance will invoke the class factory to create an instance of the requested object.

DllGetClassObject is a standard API function that every in-proc server must

implement to support CoGetClassObject; if the server is implemented in a DLL, CoGetClassObject will call DllGetClassObject. AppWizard generates this function for you:

InitInstance is called from MFC’s WinMain; with DLLs, MFC calls it from DllMain.)

The AppWizard-generated InitInstance override contains only a few lines of code:

```
BOOL CRandGenApp::InitInstance()
{
    COleObjectFactory::RegisterAll();
    return TRUE;
}
```

COleObjectFactory is the MFC class that encapsulates an OLE class factory, such that each class factory in an MFC server is an instance of this class. When each class factory is instantiated, COleObjectFactory adds its address to an internally maintained linked list so that it can access any or all of the class factories in the server.

COleObjectFactory::RegisterAll lets you start each class factory and register it as capable of manufacturing its particular type of object. A static function (meaning that it’s global and doesn’t have to be called via an instance of the class), RegisterAll swings through the linked list of class factories to register each one. Once the class factories are running, they can be invoked to create instances of the OLE objects they support.

```
STDAPI DllGetClassObject(REFCLSID
➤ rclsid, REFIID riid, LPVOID* ppv)
{
    AFX_MANAGE_STATE(AfxGetStaticModule
➤ State());
    return AfxDllGetClassObject(rclsid,
➤ riid, ppv);
}
```

with an implementation that calls an internal MFC function, AfxDllGetClassObject. That function will search the linked list of object factories (maintained by COleObjectFactory) in the server for the one that can manufacture the desired type of object and return a pointer to its IUnknown.

DllCanUnloadNow is similar. An OLE client can call an OLE API function, CoFreeUnusedLibraries, from time to time to free resources and unload any DLLs that are no longer being used. CoFreeUnusedLibraries internally calls DllCanUnloadNow in each in-proc server, so AppWizard provides an implementation of this function for you as well:

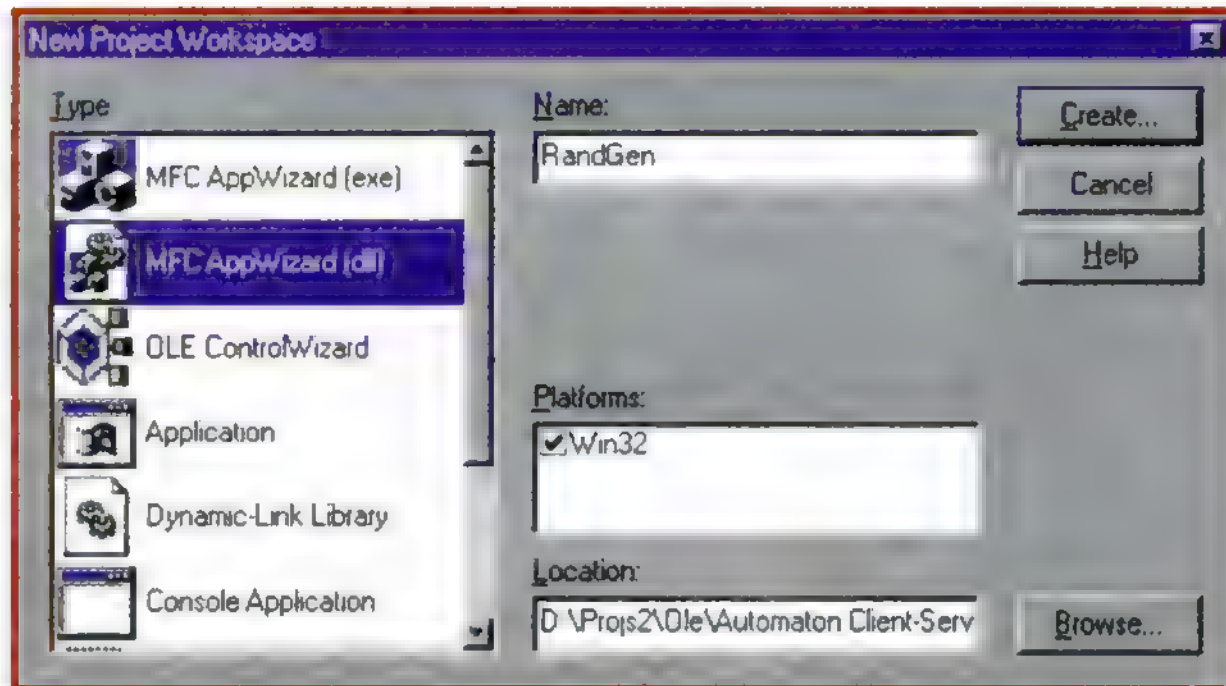


FIGURE 3: AppWizard lets you configure the options controlling what type of project will be generated and what features the project will include.


```
STDAPI DllCanUnloadNow(void)
{
    AFX_MANAGE_STATE(AfxGetStaticModule
        State());
    return AfxDllCanUnloadNow();
}
```

`DllCanUnloadNow` calls the internal MFC function, `AfxDllCanUnloadNow`, which first calls another internal function, `AfxOleCanExitApp`. This function does a quick check to see if the total number of objects in an MFC application or DLL is greater than zero: If there are no active objects, the component can terminate. And if there are no active objects, `AfxDllCanUnloadNow` swings through `COleObjectFactory`'s linked list to see if any of the class factories (including class factories in DLLs loaded by this one) are in use; if not, the function indicates that the DLL can be unloaded. Thus, the implementation of `DllCanUnloadNow` ensures that an MFC in-proc server is unloaded by a client once there are no active objects or class factories in use by the client.

If an in-proc server doesn't implement and export `DllCanUnloadNow`, then the DLL won't be unloaded until the client calls `CoUninitialize`, which is what an OLE client (or container) uses to shut down OLE after the client has closed its application windows and has returned from its main message loop. If a client uses a lot of servers, the ones that don't implement `DllCanUnloadNow` will remain loaded long after they're no longer used—possibly occupying valuable memory and resources. Implementing `DllCanUnloadNow` ensures that an in-proc server is unloaded as soon as it's no longer needed, freeing up memory and resources.

We'll discuss the third function generated by AppWizard, `DllRegisterServer`, in detail below.

IMPLEMENTING THE SERVER CLASS

Once you've generated the code for the generic in-proc server, you can start adding MFC classes to implement Automation server objects. In this server, I needed a single class that supported basic window message-handling (to respond to timer messages), so I used the Visual C++ ClassWizard to derive a new class from MFC's `CWnd` class. I chose `CWnd` because I needed to create a window and handle window messages like `WM_TIMER`, but you can use any class derived from MFC's `CCommandTarget` class (`CWnd` and many others) to create a class that supports Automation.

To add Automation support to a new class, you check one of two options: Automation, which adds the capability to support a table of properties and methods; or Createable by type ID, which further adds a name and a GUID for identifying the Automation object in the System Registry. You should use the

"Createable" option when you want to create an Automation object that can be instantiated from the outside, for example, via Visual Basic's `CreateObject` function. (The Automation option is useful only when you create classes that support Automation that can be instantiated only via another Automation object—for example, as part of an object hierarchy.)

When I selected the "Createable" option, I also plugged in the Automation object's programmatic ID, the name by which it will be known in the System Registry: `RandGen.Generator`. The programmatic ID always follows the convention:

```
componentname.objectname
➔[.version_number]
```

You should always make this as identifiable as possible. Since the in-proc server DLL will be called `RANDGEN.DLL`, I used the server name and then the Automation object name as the programmatic ID. I opted to skip the version number. Once I was finished with this dialog, I closed it, and ClassWizard generated the new class.

This is where the fun begins: With a little point-and-click and a bit of coding, I quickly added the requisite properties and methods. For instance, before you can support the generation of random numbers, you have to initialize the random number generator in the C library, via the `srand` function. I added a call to `srand` in the `CGenerator` constructor so that a new `CGenerator` object would initialize the random number generator using the current system time:

```
srand((unsigned)time(NULL));
```

Because an Automation client that uses `CGenerator` might want to provide its own random number "seed," I added an `Initialize` method that uses the same line of code. To do this, I invoked ClassWizard, switched to its Automation pane, and pressed `Add Method...`. This will invoke the `Add Method` dialog. Here you can specify the name of the method (the External name), the name of the C++ member function that implements that method (the Internal name), and the method's return type and arguments, if any. For the `Initialize` method, I made the return type `void` and added a single `long` argument. When I finished, ClassWizard added the function declaration to the class definition:

```
afx_msg void Initialize(long
    ➔initializer);
and an empty function definition:
void CGenerator::Initialize(long
    ➔initializer)
{
}
```

To complete this function, all I had to do was to add a call to `srand` using the new function argument:

```
srand((unsigned)time(NULL));
```

In addition, ClassWizard added an entry to a table of properties and methods that are part of the class definition:

```
BEGIN_DISPATCH_MAP(CGenerator, CWnd)
//{{AFX_DISPATCH_MAP(CGenerator)
DISP_FUNCTION(CGenerator,
    ➔"Initialize", Initialize,
    ➔VT_EMPTY, VTS_I4)
...
//}}AFX_DISPATCH_MAP
END_DISPATCH_MAP()
```

This *dispatch map* lets you define class members as implementations of methods and properties in an Automation object. Thus, the C++ class—once instantiated—will *become* the Automation object in the server.

COMPLETING THE IMPLEMENTATION

The rest of the server implementation followed the same paradigm: Use ClassWizard to add a new property or method and then complete the implementation of the new property or method.

For example, to add a method for retrieving a new random number, I used ClassWizard to create the `GetNumber` method and then completed the implementation of that method with:

```
short CGenerator::GetNumber()
{
    return (short)rand();
}
```

Again, ClassWizard did all the real work (adding the function declaration to the class definition, updating the dispatch map, and generating the empty function body). The only code I had to write was the one line of code inside the function body, above. Thus our Visual Basic Automation client is really calling `CGenerator::GetNumber` in the server when it executes the following line:

```
RSet temp = Str(RandGen.GetNumber())
```

To add the functionality to create a timer—and implement the server object's `StartGenerating` and `StopGenerating` methods, not to mention the `TimerInterval` property—was trickier. First, I had to add code that would create a window to be associated with the `CWnd`-derived class, `CGenerator`. `CWnd` is the base windowing class in MFC, so I had to derive from it or one of its derivatives to create a timer and receive `WM_TIMER` messages. Plus, I had to create the actual window. To do

this, I added some code to the class constructor to create a window by calling `CWnd::CreateEx`, which is inherited from `CWnd` by `CGenerator`. `CreateEx` creates the associated window by calling `CreateWindowEx` in the Windows API, and it stuffs the returned window handle into `CWnd::m_hWnd`, a data member of `CWnd`. Because of the way MFC handles window creation, I additionally had to override `CWnd::PreCreateWindow` to fake MFC into thinking I was creating a child window, when actually I wasn't. But the real work came in the implementation of the two methods and one property.

To add the `TimerInterval` property, I used ClassWizard's Automation pane and pressed **Add Property...** to invoke the **Add Property** dialog. This dialog lets you implement a new property in two ways: as a pair of Get-Set member functions in the class or via a combination of a data member (to store the property value) and a notification function. The first approach gives you more control when the client gets or sets a property value, but it does not allocate storage for the property in the class. The latter approach allocates the storage but only passively notifies you when the property has been changed: The notification function is called by MFC only *after* the property has changed. I used this approach, and ClassWizard added the following declaration to the `CGenerator` class definition:

```
short m_timerInterval;  
afx_msg void OnTimerIntervalChanged();
```

along with this code in the dispatch map:

```
DISP_PROPERTY_NOTIFY(CGenerator,  
    "TimerInterval", m_timerInterval,  
    OnTimerIntervalChanged, VT_I2)
```

and an empty notification function implementation:

```
void CGenerator::OnTimerInterval  
    Changed()  
{  
}
```

I added some code to the class constructor to initialize the timer interval:

```
m_timerInterval = 1000;
```

But the real use of this data member came in the implementation of the `StartGenerating` method. You may recall that when the Automation client calls the server's `StartGenerating` method, it passes the window handle (HWND) or an edit control as an argument:

```
RandGen.StartGenerating (Text2.hWnd)
```

So I used ClassWizard to create a method that

takes a single short argument and then added the requisite code:

```
void CGenerator::StartGenerating(short  
    editBoxhWnd)  
{  
    m_TimerhWnd = (HWND)editBoxhWnd;  
    OnTimer(1);  
    SetTimer(1, m_timerInterval, NULL);  
}
```

This function saves the argument in a class data member, `m_TimerhWnd`, and then invokes an override of `CWnd::OnTimer`:

```
void CGenerator::OnTimer(UINT  
    nIDEvent)  
{  
    CWnd* pEditWnd = CWnd::FromHandle  
        (m_TimerhWnd);  
    ASSERT(pEditWnd != NULL);  
    CString temp;  
    temp.Format("%d", rand());  
    pEditWnd->SetWindowText(temp);  
    CWnd::OnTimer(nIDEvent);  
}
```

The `OnTimer` override gets a random number into a local string object (the `CString` variable, `temp`) and passes it in a call to `CWnd::SetWindowText`—using a `CWnd` pointer that is initialized using the previously saved window handle. Thus, the `OnTimer` override will stuff a new random number into an edit control whose window handle is passed to `StartGenerating`. After `StartGenerating` calls the `OnTimer` override, it calls `CWnd::SetTimer`, which will create a timer that fires `WM_TIMER` messages to the `CGenerator` window at an interval specified in `m_timerInterval`:

```
SetTimer(1, m_timerInterval, NULL);
```

Every time the `CGenerator` window gets a `WM_TIMER` message, its `OnTimer` override gets called—consequently, `CGenerator` will stuff a new random number into the edit control again. This behavior will continue until the `CGenerator` window is destroyed (when the server is unloaded) or until the client calls the server's `StopGenerating` function, implemented by `CGenerator::StopGenerating`:

```
void CGenerator::StopGenerating()  
{  
    KillTimer(1);  
}
```

`KillTimer` then destroys the associated timer, and `WM_TIMER` messages stop.

REGISTERING THE SERVER

Once the Automation server has been compiled, it has to be registered on a system in order to be used by Automation clients there. This is

where the third function generated by AppWizard, `DllRegisterServer`, comes in. This function can be called by any Windows program to register all the Automation objects in the server. VC++ comes with a program, `REGSVR32`, that will load the server DLL (in this case `RANDGEN.DLL`) and invoke `DllRegisterServer`:

```
STDAPI DllRegisterServer(void)  
{  
    AFX_MANAGE_STATE(AfxGetStaticModule  
        State());  
    COleObjectFactory::UpdateRegistry  
        All();  
    return S_OK;  
}
```

`DllRegisterServer` calls `COleObjectFactory::UpdateRegistryAll`, which swings through the linked list of class factories and tells each one to update the Registry for its Automation objects.

Oddly enough, AppWizard doesn't generate a function to *unregister* your servers. But all you have to do is create a second function, `DllUnregisterServer`, that's all but identical to `DllRegisterServer`:

```
STDAPI DllUnregisterServer(void)  
{  
    AFX_MANAGE_STATE(AfxGetStaticModule  
        State());  
    COleObjectFactory::UpdateRegistry  
        All(FALSE);  
    return S_OK;  
}
```

The difference is the argument to `UpdateRegistryAll`, which will cause that function to tell each class factory to remove the Registry information for its Automation object. Be sure to include `DllUnregisterServer` in your project's `.DEF` file. Then a call to `REGSVR32` with the `/u` option will invoke this function and unregister the server.

NEW DIRECTIONS

OLE Automation is just the tip of the iceberg in that it makes possible exposing a set of properties and methods from one component for use by another. An extension to Automation, OLE Controls, lets you build in-process servers that can actually share the client's user interface and interact with the user while offering built-in properties and methods and a mechanism for firing asynchronous notifications back to the client. As we've seen in this series, OLE lets you extend applications in countless ways. Watch for new versions of Windows to use OLE extensively and supply many new operating system features as OLE Automation servers or OLE Controls. □

Richard Hale Shaw is a contributing editor of PC Magazine.



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PC Tech/Internet Tools

By Tony Pompili

Evolving Internet Security Methods

SSL has flaws—is Fortezza the answer to the Internet privacy problem?

Security is the buzzword of the day on the Internet. The Internet continues to grow globally, and intranets have become increasingly popular as well. This tremendous new market has provoked both users and service providers to seek greater assurances that information being passed along the Internet is secure.

Two areas of security on the Internet are being addressed: general security and financial-transaction security. Solutions to financial security problems could open up the Internet to a vast array of money-making services. Credit card giants MasterCard and Visa as well as software mavens Microsoft and Netscape are getting into the act. These are financial security issues, while this column addresses general security.

General security attempts to tackle basic privacy. For example, e-mail as it now stands hops from SMTP server to server. Sometimes it's copied from one hard disk location to another as a simple text file, which means that anyone can read it. The Internet's approach to e-mail delivery is analogous to hanging your laundry on an outdoor clothesline rather than throwing it in a home dryer. It doesn't matter whether the message contains financial information: Any information you send across the Internet should be private.

Besides content privacy, users want to know to whom they are talking. They need to be sure that the Internet server on which they're opening a session is the real McCoy, whether it's a World Wide Web, FTP, IRC, or other server. It doesn't take much for someone to imitate, or spoof, an unsecure server and try to collect private information about you. Of course, the service providers also want to be sure that the folks accessing its Internet services, such as mail and IRC services, are who they claim to be.

FIREWALL PROTECTION

Firewalls are by far the most standard security implementations in use today. These fairly secure but rather inflexible systems depend on a

variety of techniques, ranging from filtering based on IP address to blocking users from direct access to the Internet and intranets. The problem with firewalls is that their specific purpose is to keep users off private networks and LANs. Sometimes they are used to keep private-network Internet enthusiasts, such as users on a corporate LAN, from accessing Internet services other than basic Internet e-mail. A firewall's premise is to protect private information and reduce unwanted traffic.

But Internet users and service providers prefer to think about general security as keeping information private to the sender and receiver and ensuring that services and users know exactly who or what is at the end of the line.

tion user log-on. A snooping hacker could listen on the wire to these simple terminal log-in processes to intercept password and user-name information. *Encryption* deters such mischief by scrambling the user ID and password information before sending it over the wire (for more information, see "How Secure Is Encrypted Data?", *PC Magazine*, October 25, 1994). SSL bears a substantial similarity to such authentication techniques as PAP or CHAP, which many remote access systems use.

But passwords and IDs aren't the only data that needs to be protected from unwanted viewing. How about electronic mail or even a file being downloaded from an FTP server? SSL uses encryption—specifically, bulk encryption—to secure nearly everything that's transmitted between an SSL browser and a server.

Acceptance of SSL as a standard, like most standards in the PC industry, is based more on market consensus than certification by a standards bureau. SSL's heavy industry backing and widespread endorsement will make it a major player. Netscape, however, has been hedging its bet by seeking approval from standards bureaus in addition to industry acceptance. It submitted SSL 3.0 in Internet Draft form to the Internet Engineering Task Force (IETF) in an

effort to get it certified as an Internet standard. If IETF does endorse SSL 3.0, Netscape's competitors benefit because the specification would then be made available for free to developers. For now, companies that incorporate SSL 2.0 into products such as browsers must pay Netscape a licensing fee.

SSL is far from flawless. Opponents have expressed concern about the shallowness of the encryption. Netscape uses a 40-bit key in the international versions of its browser and servers, as required by the State Department. The RC4 regulations—named for the RC4 algorithm on which SSL is based—limit the export of products with encryption keys longer than 40 bits. These regulations make Netscape's 128-bit encryption key illegal outside the U.S. The now-famous cracking of an SSL 2.0 key by two Berkeley graduate stu-

INTERNET SECURITY METHODS

	Firewall	SSL	PCT	S-HTTP	Fortezza
Pros	Isolates private LANs/intranets.	Current de facto standard; data privacy.	Uses SSL as base; better authentication encryption claimed; backed by Microsoft.	Specific to HTTP servers.	Secure token-based/Smart-card authentication; adopted by federal government.
Cons	Not standardized; better for keeping people out than letting them in.	Encryption algorithm not highly robust.	No other major supporters.	Not supported on other Internet platforms.	Expensive to implement.
Availability	Numerous third parties.	Microsoft, Netscape, and other major browsers.	Not currently available.	Web server manufacturers.	Third-party add-in security that hooks to your browser.

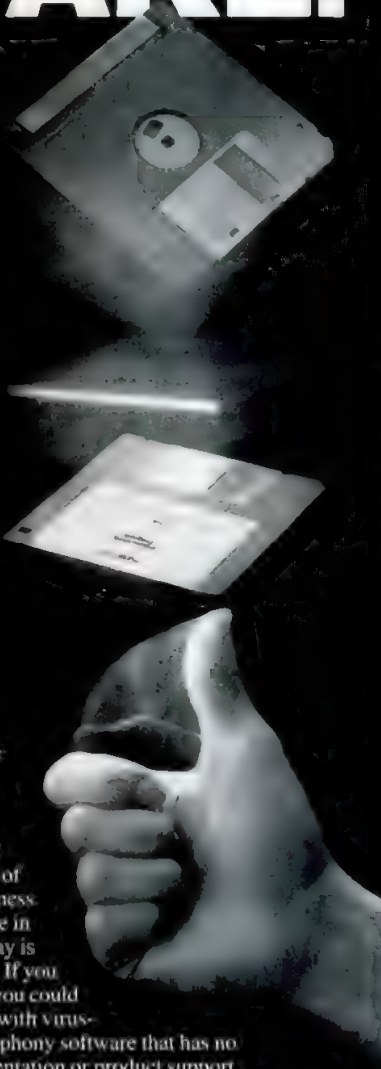
INCREASING PRIVACY AND SECURITY

THE SSL ANSWER

To this end, major software vendors have developed various options for dealing with the range of general Internet security issues. The most prominent and heavily backed is Netscape's Secure Socket Layer (SSL). Besides Netscape's own significant influence, other major players in SSL implementation include IBM, Microsoft, and even Spyglass. They are incorporating SSL to be used in client and server applications.

SSL 2.0, the current version, tackles two of the hottest areas of network security: authentication and encryption. *Authentication* ensures that both the user and server are who they say they are. From a user's standpoint, this usually means little more than entering a user identification and password. But authentication is more than an old-fashioned terminal-emula-

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PC TECH

Internet Tools

dents created some doubt about how secure SSL-based systems are (for details on the Navigator security breach, see this issue's Tutor column).

Microsoft is attempting to correct the perceived shortcomings of SSL with an SSL superset protocol called PCT (Private Communications Technology), which is expected to be included in Microsoft's forthcoming Internet everything-but-the-kitchen-sink Information Server. PCT will spawn a second key specifically for authentication. The authentication does not fall under the RC4 restrictions, because the regulations deal only with bulk encryption. Microsoft also intends to build a more robust random-number generator. The generator, considered another weak link in SSL's security chain, seeds the encryption key.

SSL and PCT are hardly competitors, however. PCT is actually more like a chip off the old SSL block, and if all goes well, SSL and PCT will actually work hand in hand. Microsoft says PCT is backward compatible with SSL 2.0. PCT dovetails so tightly with SSL that PCT developers will still have to license SSL to build PCT-based systems. Unlike what has happened with SSL, not everyone is jumping on the PCT bandwagon. At press time, the list of vendors supporting PCT was fairly short, with Spyglass the most notable inclusion. While PCT's specifications aren't available publicly, Spyglass says it has specifications and is working on a hook into its browser.

Even when beefed up with PCT, SSL is still considered inadequate as a pure security solution. General security schemes like SSL with PCT keep users from seeing the content of messages and data going over the wire but do little to address the issues of limiting or securing access to services.

For some Internet users, privacy is not enough. One large and influential user group is the U.S. government. For the Feds, near bullet-proof authentication is the key. Ensuring that users are who they say they are and services are what they claim to be is critical. The preferred and indeed mandated solution for federal government Internet users is Fortezza.

FORTEZZA—NOT AN ITALIAN DESSERT

Here's how Fortezza works. User names and passwords are not enough to ensure authentication because they are easy to learn or discover. Like SSL and PCT, Fortezza also does bulk encryption, but it uses a minimum 56-bit encryption key based on DES (Data Encryption Standard) rather than the shorter 40-bit SSL and PCT keys.

Fortezza adds a third element to the authentication process known as a *token*. Each federal government Internet user will be assigned a token, a unique identification string stored on a credit card-size microprocessor.

You need a password, or PIN, to use the token. To ensure both user and service authentication, every Internet service and user will need one of these token cards. But a card alone is not enough: A Fortezza system participant will need a reader, sort of like a credit card reader, to read the token from the card. So whether you're a single user or an FTP server, to decode Fortezza you'll need more hardware.

One company producing commercial versions of the card, called the SmartCard, is V-One Corp. in Rockville, Maryland. The company is also involved with writing custom Fortezza hooks into browsers for federal government clients attempting to comply with the government standards for authentication. By the way, if you are a Lotus Notes administrator and the Fortezza scheme sounds awfully familiar, it should. Although Notes doesn't use a hardware-based token, the Notes ID file and authentication architecture resemble Fortezza's structure.

Fortezza may sound a little ambitious, but since it's part of GOSIP (Government Open Systems Interconnectivity Protocol), you can be sure that software and hardware vendors looking for megabuck deals with the government will incorporate Fortezza hooks into their servers and client software. Fortezza will not likely be part of any widespread general-purpose or consumer-level security, but its status as a mandated Internet security system for both federal agencies and contractors will guarantee it a significant presence in any organization wanting a piece of the federal government business over the Internet.

One last protocol worth mentioning, since it seems to have drawn a little support from a handful of Web server companies, is S-HTTP (secure hypertext transport protocol). Developed by a company called Terisa Systems, the protocol is limited to dealing specifically with HTTP (Web server) transactions. The other specifications discussed here are more broadly designed to work with a variety of Internet server types.

Internet security will probably end up as a combination of specifications mentioned here (and others that have not yet joined the foray), similar to the PCT and SSL marriage. For example, Netscape has announced that it will support Fortezza as part of SSL, using the federal government's more robust authentication. Netscape, IBM, and others also have invested in Terisa, expecting to produce transaction security solutions based on SSL and S-HTTP. And, of course, how general security will interact with transaction-based systems is yet another story. One that you can be sure we'll be talking about here soon. □

Tony Pompili is a contributing editor of PC Magazine.

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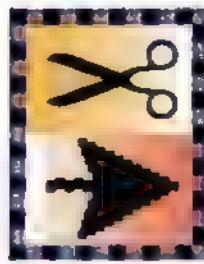
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PC Tech/Utilities

By John Deurbrouck

SCInvoke: Screen Savers on Demand

Control when your screen saver can and can't run.

Screen savers were invented to prevent unchanging images from burning into the phosphors on your monitor's screen. While newer monitors are not prone to that kind of damage, the screen saver with a password feature has turned out to be a handy way to secure your machine while you're away from it.

The problem is getting the screen saver to kick in at the appropriate time. If you're working on sensitive material, you may not want to leave it visible to all passersby while you're away. But any time out short enough to be serviceable for security is hard to live with while you're working. Did you ever get deeply involved in a problem on your computer, thinking rather than typing, and have the screen saver inconveniently activate itself?

Some screen savers offer another control mechanism. In the After Dark screen saver and, more recently, the Microsoft Windows 95 Plus! Pack, you can designate corners of the screen as hot and cold corners. When you put the mouse into the hot corner, the screen saver is invoked immediately. When you put the mouse into the cold corner, the screen saver is prevented from starting up. These mechanisms do work, but they're easy to invoke accidentally.

SCInvoke presents a tiny dialog box that's almost entirely covered by a single button. When you push the button, your screen saver is invoked immediately. When the dialog box is active (the caption bar is highlighted), the screen saver is prevented from starting up.

SCInvoke is easy to use and works with all Windows screen savers. A Win32 executable, SCInvoke was designed for Windows 95 and also works under Windows NT. If you happen to have Win32s installed on your Windows 3.1 machine, SCInvoke will work there, too.

You can obtain a copy of SCInvoke by downloading it from PC Magazine Online or by mail (see the sidebar "Guide to Our Utilities" for details). The source code for SCInvoke, which was written in Microsoft Visual C++, is also provided.

USING SCINVOKE

SCInvoke consists of a single file, SCINVOKE.EXE. To install SCInvoke, simply copy its program file to a subdirectory on your hard

disk. You may find it convenient to place the SCInvoke icon in your Startup folder so the program is launched each time you restart your machine.

When you run SCInvoke, you'll see the simple dialog box shown in Figure 1. SCInvoke affects your screen saver only if it is the active application—that is, if its title bar is highlighted. If it's running but not active, it has no effect on your screen saver. When SCInvoke is the active application, it prevents the screen saver from invoking unless you press the Invoke button. Pressing the Invoke button starts the screen saver right away.

The first time you run SCInvoke, its dialog



box will be right in the middle of the screen. You can drag it anywhere you like by clicking on the caption bar and moving the mouse. In addition, you can drag SCInvoke by clicking on any area of the dialog box other than the Invoke button. This is convenient if you want to push SCInvoke almost completely off the screen, with just a few pixels of an edge or a corner showing. Even if SCInvoke is mostly obscured, clicking the visible portion of the Invoke button will start your screen saver. Click on an edge outside the button and SCInvoke becomes active, preventing the screen saver from running. SCInvoke can occupy almost no screen real estate but still provide full functionality at all times, without requiring you to go through any menus.

Once you've decided exactly where on your screen you want SCInvoke, the program can automatically put itself in the same place every time, like the Windows 3.1 Clock. Unlike Clock, however, SCInvoke keeps track of

changes to your screen resolution. For example, put SCInvoke in the upper-right corner of your screen in 1,280-by-1,024 mode, then switch to 640-by-480 mode and put SCInvoke in the upper-right corner. If you have Save Settings on (see SCInvoke Options, below), SCInvoke recalls the position you picked for that video mode when you switch back to 1,280-by-1,024, rather than stranding the window in the middle of the screen.

If you use SCInvoke regularly, you may find it convenient to adjust your screen saver settings. If you always start your screen saver manually with SCInvoke, select a long timeout value. That way you won't have to do anything—like making SCInvoke active—to prevent the screen saver from inconveniently interrupting your work.

SCINVOKE OPTIONS

SCInvoke's options are available from its System menu (see Figure 2). The About SCInvoke... menu option brings up the SCInvoke About box. The Invoke Screen Saver menu option does the same thing as the Invoke button on the dialog box. This lets you run SCInvoke as an icon (with Windows 3.x and Windows NT) or minimized to the Taskbar (with Windows 95) and still start your screen saver on demand.

The Always on Top option, when checked, causes SCInvoke to float above other windows, even when it's not active. Much like Windows Help or Clock, this lets you see and easily access the window (and the Invoke button) even when you're running another application full-screen. This is simpler and more convenient than using the task switcher to activate SCInvoke.

The final System Menu option is Save Settings. When this option is not checked, SCInvoke will not save the screen position. This might be handy if you've saved a default location for SCInvoke but want to put it somewhere else temporarily without disturbing your normal settings.

If you've pushed SCInvoke way off the screen and want to access its system menu, click on any part of its window and then press Alt-Spacebar. Even if SCInvoke is 97 percent off-screen, the system menu will show up on-screen.

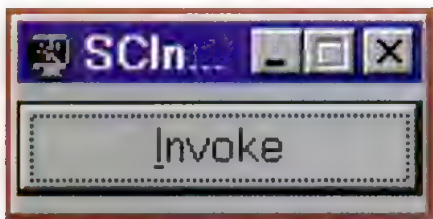


FIGURE 1: The SCInvoke dialog box is just large enough to hold a button for invoking the screen saver.

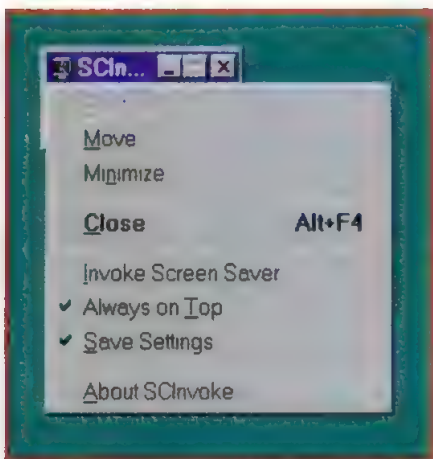


FIGURE 2: You access the SCInvoke options through the System menu.

REMOVING SCINVOKE

To remove SCInvoke from your system, first close SCInvoke from the System menu. Windows won't let you delete a running program. Then delete SCINVOKE.EXE. In Windows 3.1, your SCInvoke preferences are stored in SCINVOKE.INI, and you'll want to delete this file as well. In Windows 95 and Windows NT, the preferences are stored in the Registry, and you would need to use the RegEdit utility to remove the entries. This is not necessary and can be dangerous if you make a mistake. But those comfortable with RegEdit can delete the information stored in the key HKEY_CURRENT_USER/Software/PC Magazine/SCINVOKE.

PROGRAMMING SCINVOKE

The basics of controlling screen saver activity are pretty simple. Windows offers an easy mechanism for applications to both invoke the screen saver and prevent the screen saver from starting.

As always, though, a simple premise can get complicated when you try to add a few nifty features. Having the application remember where to put its window isn't too tough, but you'll need a way to store different coordinates for different screen resolutions. And don't forget that Windows 95 makes it easy for users to change screen resolutions without restarting Windows. To conserve screen real estate, SCInvoke lets users take the window

nearly off-screen by dragging anywhere in the client area.

Let's look at some code. I started SCInvoke with Microsoft Visual C++ 2.2, then when the new version shipped, ported it to Visual C++ 4.0. The source code required no changes under Version 4, but the Make file is different. I have included Make files for both versions. The executable distributed by PC Magazine was built with Version 4.0.

CONTROLLING THE SCREEN SAVER

As the Windows SDK documentation says, "Screen savers are loaded automatically when Windows starts or when a user activates the screen saver feature by using Control Panel. Windows monitors keystrokes and mouse movements and starts the screen saver after a period of inactivity specified by the user." Windows warns that the screen saver is about to activate by sending the WM_SYSCOMMAND message with the SC_SCREENSAVE identifier to the active application. If the application doesn't pass the message to the default window procedure, the screen saver will not activate. If an application posts that message, the screen saver begins.

SCInvoke traps the WM_SYSCOMMAND message and does not pass it to the default windows procedure, so when SCInvoke is active, the screen saver is suppressed. The control identifier for the Invoke button and the menu identifier for the Invoke command on the system menu are the same: IDM_INVOKE. When SCInvoke receives a BN_CLICKED message with this identifier, it activates the screen saver.

SCInvoke needs to distinguish an attempt by Windows to activate the screen saver from a user request via the Invoke button or System menu item. Otherwise, it would suppress its own attempts at activation. An integer member variable of the CSCInvokeDlg class called `do_process_screensaver` stores this information and controls whether or not activation is permitted.

The `OnSysCommand()` function (see Figure 3) actually allows the screen saver to start or prevents it from doing so. If `do_process_screensaver` is nonzero, we want to start the screen saver. We change `do_process_screensaver` back to zero (to prevent accidental start-up later) and pass the message on to the default dialog procedure through `CDialog::OnSysCommand()`. If `do_process_screensaver` is zero, SCInvoke prevents the screen saver from starting by eating the message and not passing it on to

the default dialog procedure.

Here's an interesting oddity regarding screen saver password protection under Windows NT 3.5x. After the screen saver starts up, there's a delay before the password is really required. To see it, make sure your screen saver requires a password entry to get access to your desktop, then press SCInvoke's Invoke button. Wait until the screen saver starts up, then move the mouse right away. If your timing is good, you won't get the password dialog box. The delay seems to range up to 5 seconds or so. It has nothing to do with SCInvoke, because a normal time-out screen saver start without SCInvoke running can also be canceled by quick reactions. This bug—um, feature—does not exist in Windows 95, which requires a password the instant the screen saver is invoked.

PERSISTENT WINDOW PLACEMENT

It's obvious that you can't use the same set of absolute screen coordinates for all screen resolutions. The user who wants the window in the lower-right corner will have coordinates like (610,466) in one screen resolution and (1250,1000) in another. Simply using one set of coordinates isn't satisfactory. The old Windows Clock did that, and it wasn't as seamlessly usable as the designers undoubtedly wanted.

Why store actual coordinates? Why not simply remember "lower-left corner" or "upper-right corner" and guess positions based on the user's choices in other screen resolutions? One problem with this approach is that you have to decide how to interpolate the numbers. If the user is parking a window at the edge of the screen and the window size is

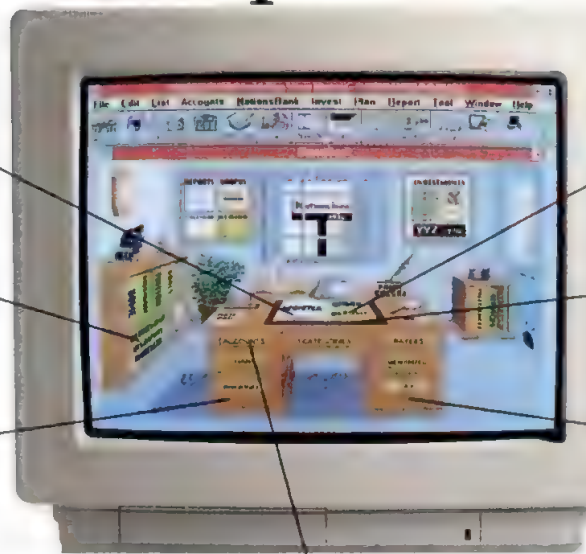
```
void CSCInvokeDlg::OnSysCommand(UINT nID, LPARAM lParam) {
    if ((nID & 0xFFF0) == IDM_INVOKE)
        activate_screensaver();
    else if ((nID & 0xFFF0) == SC_SCREENSAVE){
        if(do_process_screensaver){
            do_process_screensaver=0;
            CDialog::OnSysCommand(nID, lParam);
        } // otherwise eat the message
    }
    else CDialog::OnSysCommand(nID, lParam);
}
```

FIGURE 3: The `OnSysCommand()` function allows the screen saver to invoke or prevents it from doing so.

the same in different screen resolutions, it may be that you'd add or subtract a constant number from the screen dimensions to place the window correctly. For example, putting a 30-by-30 window in the upper-right corner of the screen requires an x coordinate of `GetSystemMetrics(SM_CXSCREEN) - 30` and a y coordinate of 0.

But what if the user likes the window four

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```
void CScInvokeDlg::read_configuration(){
    // get screen resolution
    do_ScreenX=GetSystemMetrics(SM_CXSCREEN);
    do_ScreenY=GetSystemMetrics(SM_CYSCREEN);

    // get default coordinates if any
    {
        // create resolution section string
        char dims[20];
        wsprintf(dims,"%dx%d",do_ScreenX,do_ScreenY);
        int got_coords=1; // assume will work
        if(!GetProfileInt(dims,"X_Coordinate",do_PosX))got_coords=0;
        else if(!GetProfileInt(dims,"Y_Coordinate",do_PosY))got_coords=0;

        if(got_coords){ // got coords from file
            SetWindowPos(NULL,do_PosX,do_PosY,0,0, // move window
                SWP_NOACTIVATE|SWP_NOSIZE|SWP_NOZORDER);
        }
        else CenterWindow(); // center the screen
    }
}
```

FIGURE 4: The `read_configuration` function, invoked from within the dialog's `OnInitDialog()` method, gets the width and height of the screen at the current resolution.

fifths of the way to the bottom of the screen and all the way to the right? Then the offset from the right of the screen is fixed at 30, but the offset from the top of the screen is 384 in 640-by-480 mode but 614 in 1,024-by-768 mode. The easiest way to give users exactly what they want is to save the coordinates for each screen resolution. For readability, I used section names corresponding to screen resolutions.

The `read_configuration` function (see Figure 4), invoked from within the dialog's `OnInitDialog()` method, gets the width and height of the screen at the current resolution by calling the `GetSystemMetrics` API function. It then creates a section name string comprising those two numbers separated by an x. Thus, if the current screen is 1,280 by 1,024, the function will search the section "1280x1024" for the values of the keys `X_Coordinate=` and `Y_Coordinate=`. If both coordinates are present, the window is moved to the appropriate location. If not, the window is centered.

In 32-bit Windows, .INI files exist only for backward compatibility. The approved storage location for persistent application data is the Registry. So, I wanted to use the Registry under Windows 95 and Windows NT to save screen coordinates. Fortunately, that's easy: Simply call `SetRegistryKey()` in the application's `InitInstance()`.

RESPONDING TO SCREEN-SIZE CHANGES

Versions of Windows before Windows 95 had no direct system support for changing the screen resolution without restarting Windows, although some drivers were able to do this. Programs could deal with such drivers by watching for `WM_WININICHANGE` messages and reobtaining screen dimensions when the message was received. But there was no insurance that

the driver would correctly broadcast this message after changing the screen resolution.

Windows 95 was designed to allow the user to change screen resolutions without restarting Windows, and so the need to watch for `WM_WININICHANGE` is gone. Instead, there's a new message, `WM_DISPLAYCHANGE`, which is sent after the screen resolution changes. In addition, Windows 95 will reposition windows that otherwise would be off-screen after the resolution change. For example, an 80-by-30 window at the right edge of a 1,024-by-768 display would simply disappear when the screen resolution changed to 640 by 480 unless it was repositioned.

The `WM_DISPLAYCHANGE` is sent *after* both changes occur—the resolution is changed and the windows are repositioned as needed. This creates a problem for `SCInvoke`, which would like to save the position of its window just prior to the resolution change. By the time `SCInvoke` receives the `WM_DISPLAYCHANGE` message, the old coordinates have been lost. In beta versions of Windows 95, the `WM_DISPLAYCHANGE` message was sent twice for each screen resolution switch. The first time was before any repositioning took place. `SCInvoke` had a simple task then, because it could intercept the first `WM_DISPLAYCHANGE`, query the window position and screen size, and write the current position. But with the release version of

Windows 95, a more complicated strategy is needed.

`SCInvoke` solves this problem by caching the screen coordinates every time the window moves. If a `WM_DISPLAYCHANGE` message is received, it disregards the most recent position change. Figure 5 shows the code that picks up previous window positions. Every time a `M_WINDOWPOSCHANGED` message is received, the new window location is cached in `do_PosX` and `do_PosY`. The previous position is placed into `m_PreviousX` and `m_PreviousY`.

The `WM_DISPLAYCHANGE` handler sets `m_UsePrevious`, then forces the current configuration to be saved through `write_configuration()` and `read_configuration()`. The `write_configuration()` function replaces the user's preferred-position values with the cached values if both `m_HavePrevious` and `m_UsePrevious` are set. To avoid unnecessary writes to the .INI file or Registry, the program compares the old and new values and writes the new value only if it's different.

CLIENT-AREA DRAGGING

If you want a user to be able to drag the window around by clicking anywhere on the window's client area, you need to handle the `WM_NCHITTEST` message. Class Wizard makes it easy. Here's a handler that implements client-area dragging:

```
UINT CScInvokeDlg::OnNcHitTest(CPoint point)
{
    UINT def=CDialog::OnNcHitTest(point);
    return (def==HTCLIENT) ? HTCAPTION:def;
}
```

```
// position onscreen
int do_PosX,do_PosY;
// maintained by WM_WINDOWPOSCHANGED
int m_PreviousX,m_PreviousY;
// set by WM_WINDOWPOSCHANGED, WM_DISPLAYCHANGE
int m_HavePrevious;
// set by WM_DISPLAYCHANGE
int m_UsePrevious;

void CScInvokeDlg::OnWindowPosChanged(
    WINDOWPOS FAR* lpwndpos) {
    /* other code omitted */
    CDialog::OnWindowPosChanged(lpwndpos);
    RECT r;
    GetWindowRect(&r);
    m_PreviousX=do_PosX;
    m_PreviousY=do_PosY;
    m_HavePrevious=1;
    do_PosX=r.left;
    do_PosY=r.top;
}
```

FIGURE 5: The `OnWindowPosChanged()` event handler stores the previous window position.

The handler works by first allowing the inherited handler `CDialog::OnNcHitTest()` to process the message. If the return value is `HTCLIENT`, indicating a click in the client area, we return a value of `HTCAPTION`. This makes Windows treat the click like a click on the caption bar, enabling dragging. Add this feature if you want to let users place the window so that the caption bar is off-screen or if you don't want to display a caption bar at all (like the Windows Clock).

OVERCOMING WINDOWS 95'S HELPFULNESS

Once you've implemented client-area dragging, you'd think the user could then drag the window nearly off-screen. This works fine in Windows 3.1 and Windows NT, but Windows 95 is a bit more helpful. If Windows 95 sees a caption bar destined for the wasteland beyond the physical screen, it pops the window back to a more reasonable position. Good intentions, but not what we want.

How do we put Windows 95 back in its place? To find out, I monitored `SCInvoke` with `Spy++`, a utility that comes with Visual C++. I captured all messages destined for the dialog box so I could see where the changes were being made. I had to wade through a huge series of messages, but the detective work was pretty easy.

The first message that sheds some light on the process is `WM_ENTERSIZEMOVE`, which indicates that the user has begun to drag the window. This is followed by a set of messages that occur over and over again during the drag:

```
WM_MOVING
WM_WINDOWPOSCHANGING
WM_MOVE
WM_WINDOWPOSCHANGED
```

When the mouse button is released, the sequence changes slightly:

```
WM_MOVING
WM_WINDOWPOSCHANGING
WM_CAPTURECHANGED
WM_WINDOWPOSCHANGING
WM_WINDOWPOSCHANGED.
```

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- 6 **INCTR2** Monitors program installation
- 7 **WINBAR** Taskbar for Windows 3.1
- 8 **SPAD** Enhanced Windows Notepad
- 9 **FDDLs** Finds dead DLLs
- 10 **FINDIR** Analyzes IRQ lines

After the `WM_WINDOWPOSCHANGING` message, there's a new message, `WM_CAPTURECHANGED`, and an extra `WM_WINDOWPOSCHANGING` message. Apparently what happens is that Windows 95 first moves the window's caption bar off-screen as requested, then notices that it's off-screen and moves it back.

The strategy, therefore, is to identify the second `WM_WINDOWPOSCHANGED` message by watching for `WM_CAPTURECHANGED` and then overwrite the coordinates of this second message with the coordinates from the first message. Figure 6 shows the code for doing this.

Although this works reliably in the current version of Windows, it's worthwhile to note that this sequence of messages is undocumented and therefore subject to change. In fact, the documentation on `WM_CAPTURECHANGED` says that the timing of its arrival is not guaranteed. But I found no other message that could perform the same function. I thought of watching just `WM_WINDOWPOSCHANGING` and `WM_WINDOWPOSCHANGED`, updating sequential `WM_WINDOWPOSCHANGING` messages so that only the first after each `WM_WINDOWPOSCHANGED` was actually used, but this is unreliable. It's possible to get multiple sequential `WM_WINDOWPOSCHANGING` messages for reasons other than Windows 95's little adjustment.

The `WM_CAPTURECHANGED` strategy works reliably for now. If the message pattern

```
/*
Set m_SnagWindowPos when WM_ENTERSIZEMOVE is detected
Set m_ForceWindowPos when WM_CAPTURECHANGED is
detected while m_SnagWindowPos is set
Reset m_ForceWindowPos when WM_WINDOWPOSCHANGED is
detected
*/
int m_SnagWindowPos, m_ForceWindowPos, m_SnaggedX,
m_SnaggedY;

afx_msg LRESULT CScInvokeDlg::OnEnterSizeMove
(WPARAM,LPARAM) {
    // must grab WM_WINDOWPOSCHANGING messages now
    // until WM_CAPTURECHANGED is found
    m_SnagWindowPos = 1;
    m_ForceWindowPos = 0;
    return TRUE;
}

afx_msg void CScInvokeDlg::OnCaptureChanged(CWnd* p) {
    if (m_SnagWindowPos) {
        m_SnagWindowPos = 0;
        m_ForceWindowPos = 1;
    }
    CDialog::OnCaptureChanged(p);
}
```

```
void CScInvokeDlg::OnWindowPosChanged(WINDOWPOS FAR*
lpwndpos) {
    if (m_ForceWindowPos) {
        m_SnagWindowPos=0;
        m_ForceWindowPos=0;
    }
    CDialog::OnWindowPosChanged(lpwndpos);
    /* ... other code omitted ... */
}

void CScInvokeDlg::OnWindowPosChanging(WINDOWPOS FAR*
lpwndpos) {
    if (m_SnagWindowPos) {
        m_SnaggedX = lpwndpos->x;
        m_SnaggedY = lpwndpos->y;
    }
    if (m_ForceWindowPos) {
        lpwndpos->x = m_SnaggedX;
        lpwndpos->y = m_SnaggedY;
        m_SnagWindowPos = 0;
        m_ForceWindowPos = 0;
    }
    CDialog::OnWindowPosChanging(lpwndpos);
}
```



FIGURE 6: This code overcomes Windows 95's "helpfulness" and allows `SCInvoke`'s caption bar to be moved off the screen.

changes in future Windows versions, you will only be able to shove SCInvoke off the sides and bottom, not the top.

WINDOWS 95 ICON HANDLING

In dialog-only applications, Visual C++ 2.2's Class Wizard puts in a bit of code that provides an icon when the application is minimized or dragged. The icon is loaded in the dialog's constructor, and the handle is stored in the variable `m_hIcon`. The `OnPaint()` function paints the icon when the dialog is iconic, and the `OnQueryDragIcon()` function displays the icon while it's being dragged.

Native Windows 95 applications are supposed to use a different mechanism for this purpose: the `WM_SETICON` message. Otherwise, you will see the default application icon (the flag logo) on the Taskbar and when you

use the Alt-Tab task switcher. Fortunately, fixing this problem takes only two lines of code in `OnInitDialog()`:

```
BOOL CSCInvokeDlg::OnInitDialog() {
    CDialog::OnInitDialog();
    /* other code omitted */
    // set the icon for task bar, alt-
    // tab switch interface

    SendMessage(WM_SETICON, (LPARAM)m_hIcon);
    // TRUE, (LPARAM)m_hIcon);

    SendMessage(WM_SETICON, (LPARAM)m_hIcon);
    // FALSE, (LPARAM)m_hIcon);
    return TRUE;
}
```

Simply adding this to `OnInitDialog()` tells Windows 95 to use your application logo in

the Windows 95 user interface. The `WM_SETICON` message associates a large or small icon with a window. If `wParam` is `TRUE`, the message sets the large icon. If `FALSE`, the message sets the small icon.

SCInvoke is based on a simple idea, but it demonstrates some handy programming techniques. It's also just plain useful. For those who use screen savers to password-protect their computers while away from their desks, it provides instant security. And it prevents your screen saver from kicking in while you're staring thoughtfully at your computer. □

John Deurbrouck is a senior programmer at a large software company in Redmond, WA (not the one you think!). He has recently been adding artificial intelligence capabilities to children's educational software. He can be reached at 76530.371@compuserve.com.

GUIDE TO OUR UTILITIES

ABOUT SCINVOKE...

PURPOSE: Screen savers are useful for password-protecting your computer—the trick is getting them to invoke when you want them to. SCInvoke presents a very small dialog box that's almost entirely covered by a single button. When you push the button, your screen saver is invoked immediately. When the dialog box is active (the caption bar is highlighted), the screen saver is prevented from starting up.

USAGE: To install SCInvoke, simply copy the file `SCINVOKE.EXE` to a directory on your hard disk and create an icon for it in your shell. SCInvoke works under Windows 3.1, Windows 95, and Windows NT. You may want to place the SCInvoke icon in your Startup group.

The first time you run SCInvoke, it will put its dialog box right in the middle of the screen. You can drag it anywhere you like by clicking on the caption bar and moving the mouse. In addition, you can drag SCInvoke by clicking on any area of the dialog box other than the Invoke button. This is convenient if you want to push SCInvoke almost completely off the screen, with just a few pixels of an edge or a corner showing. Click on an edge outside the button and SCInvoke becomes active, preventing the screen saver from invoking.

SCInvoke's options are available from its System menu. The Invoke Screen Saver menu option does the same thing as the Invoke button on the dialog box. This lets you run SCInvoke minimized and still start your screen saver on demand. The Always on Top option causes SCInvoke to float above other windows, even when it's not active. The Save Settings option stores SCInvoke's window position.

If you've pushed SCInvoke way off the screen and want to access its System menu, click on any part of its window and then press Alt-Spacebar.

FILES FOR DOWNLOAD:

`SCINVOKE.EXE`—The program file.
`SCINVOKE.TXT`—The documentation file.
`SCINVOKE.ZIP`—The source, program, and documentation files.

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PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

User-to-User

By Neil J. Rubenking

Modify Serial Numbers With Batch Files

Since the advent of MS-DOS 4.0, serial numbers have been assigned to disks during format. You'd think there would be some benefit to this, but to date I haven't found these numbers to be useful for anything. And they tend to be a nuisance, as they clutter the screen and send extra lines to the printer.

To eliminate unwanted serial numbers, I've written NOSERIAL.BAT (Figure 1). NOSERIAL makes use of the fact that the value 29h at address 26 in the boot sector of a disk marks the presence of an extended BIOS Parameter Block. The next four bytes hold the serial number. If this marker is changed to 00, the serial number is no longer recognized. The batch file does not overwrite the serial number itself.

The number DOS sets is nearly random. If you'd like to have well-ordered serial numbers,

NUSERIAL.BAT (Figure 2) will set serial numbers as desired. You pass five parameters to the batch file. The first is the drive letter, and the next four contain the serial number with the hexadecimal digits in the desired order. For example, to assign the serial number 1234-ABCD to the disk in drive A:, use the command

```
NUSERIAL a:12 34 ab cd
```

To restore a serial number that has been eliminated by NOSERIAL.BAT, just run NUSERIAL.BAT with the drive parameter only.

BRUCE W. SHUMWAY,
Silver Spring, Maryland

PC MAGAZINE: Every disk has a BIOS Parameter Block (BPB) at the start of its boot sector that contains essential disk specifications. DOS 4 defined an extended BPB, appending the 4-byte serial number and a copy of the Volume Label. Floppy disks formatted by

DOS versions before 4.0 don't have serial numbers. The NOSERIAL batch file changes a single byte to make a floppy disk look like it was formatted using an earlier DOS version, thus preventing display of the serial number.

I commented out two lines in each batch file to restrict them to drives A: and B:. There's always a possible danger when you meddle with a disk's boot sector, and that faint possibility of trouble outweighs the benefits of changing a hard disk's serial number. Be prepared for the possibility that these batch files will set off your antivirus monitor as well. They are totally virus-free, but antivirus monitors generally flag any program that modifies a disk's

```
@ECHO OFF
IF '%1'=='' GOTO Syn
SET Opt=
FOR %%v IN (a A a: A:) DO IF '%1'=='%v' SET opt=0
FOR %%v IN (b B b: B:) DO IF '%1'=='%v' SET opt=1
::Use on hard disks disabled by default.
::FOR %%v IN (c C c: C:) DO IF '%1'=='%v' SET opt=2
::FOR %%v IN (d D d: D:) DO IF '%1'=='%v' SET opt=3
IF '%opt%'=='' GOTO Syn

ECHO L 0 %opt% 0 1 > t$e$m$p$
ECHO e 26 00 >> t$e$m$p$
ECHO w 0 %opt% 0 1 >> t$e$m$p$
ECHO q >> t$e$m$p$
DEBUG < t$e$m$p$ > NUL
DEL t$e$m$p$
SET opt=
FOR %%v IN (a b c d A B C D) DO IF '%1'=='%v' SET opt=:
ECHO Serial number cleared from drive %1%opt%
SET opt=
GOTO End

:Syn
ECHO Syntax: NOSERIAL d:
ECHO      where d: is the drive to be cleared
:End
```



FIGURE 1: This batch file effectively removes a floppy disk's serial number by making it appear to have been formatted with a DOS version before 4.0

HIGHLIGHTS



HARDWARE Find out why a little cold treatment may be exactly what your unresponsive hard disk needs. *Page 226*



OPERATING ENVIRONMENTS We explain what the "Out of environment space" message means and how you can avoid it when you're trying to run a batch file. *Page 230*



WORD PROCESSING Microsoft Word's Ref field makes it possible to combine repeating text and sequential numbers. *Page 234*

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PC DIRECT starts here with exciting offers from top direct vendors. See index, page 226.

```
@ECHO OFF
IF '%1'=='' GOTO Syn
SET Opt=
FOR %%v IN (a A a: A:) DO IF '%1'=='%v' SET opt=0
FOR %%v IN (b B b: B:) DO IF '%1'=='%v' SET opt=1
::Use on hard disks disabled by default.
::FOR %%v IN (c C c: C:) DO IF '%1'=='%v' SET opt=2
::FOR %%v IN (d D d: D:) DO IF '%1'=='%v' SET opt=3
IF '%opt%'=='' GOTO Syn

ECHO L 0 %opt% 0 1 > t$e$m$p$
ECHO E 26 29 %5 %4 %3 %2 >> t$e$m$p$
ECHO w 0 %opt% 0 1 >> t$e$m$p$
ECHO q >> t$e$m$p$
DEBUG < t$e$m$p$ > nul
```

```
DEL t$e$m$p$
SET opt=
FOR %%v IN (a b c d A B C D) DO IF '%1'=='%v' SET opt=:
ECHO Serial number changed for drive %1%opt%
DIR %1%opt% | FIND "Serial Number is"
SET opt=
GOTO End
:Syn
ECHO Syntax: NUSERIAL d: xx xx xx xx
ECHO where d: is the drive to get a new serial number
ECHO and xx xx xx xx are the eight hexadecimal digits
ECHO ordered as desired i the serial number
ECHO Example: NUSERIAL a: 12 34 AB CD yields serial
ECHO number 1234-ABCD
:End
```

FIGURE 2: Use this batch file to set a floppy disk's serial number to any value you wish.

boot sector, since that's the way many viruses reproduce.

In case you were wondering, the **FORMAT** program's algorithm for calculating the serial number is not random. It's an arcane calculation based on the precise date and time the disk was formatted. The four bytes of the serial number are:

- Month plus seconds.
- Day plus hundredths of a second.
- High byte of the year plus hours.
- Low byte of the year plus minutes.

This bizarre calculation isn't reversible; given a serial number, you cannot determine the date and time the disk was formatted.

You can download both of these batch files from **PC Magazine Online**.

Managing the Windows 95 New Menu

Right-clicking on the Windows 95 desktop or in an Explorer window brings up the New submenu, giving you the option to create a new folder or a file of a selected type. But after you've installed a number of new applications, that submenu can become quite cluttered with file types you may not need. Microsoft's **TweakUI** Power Toy allows you to add file types to the New menu, but it doesn't give you the ability to remove the ones you don't need. There is an easy way to do this, though, by editing the Windows 95 Registry. Here's how.

Start the Registry Editor by choosing **Start | Run | Regedit**. Then find your way on the Explorer-like tree to **MyComputer\HKEY_CLASSES_ROOT**. If you expand this branch, you'll see others named for the default extensions of different file types. Expand the one showing the extension of the file type you want to remove from the New submenu. For example, to remove the option that creates a new Excel document (.xls), find the Registry entry called **MyComputer\HKEY_CLASSES_ROOT**

.xls. Expand it and highlight the **ShellNew** entry underneath, then press **Del** to remove it and close **Regedit**. You can also delete any corresponding template file in the **WINDOWS\ShellNew** folder.

Now when you right-click to bring up a New menu, the file type you removed will no longer appear. Of course, you can still create a file of that type by launching its application and clicking on **File | New**. One warning: Don't remove the **ShellNew** entries for **.bfc** and **.lnk**; these are used for creating new Briefcases and new Shortcuts, respectively.

JON MORROW, New York, New York

PC MAGAZINE: Items you'd want to remove from the New menu are ones you almost never use—the catch is that if you never use them, you may not know the corresponding extension. Don't worry: Just use the New menu to create an item of the doomed file type. Right-click on the new item and look at its properties to see the extension, then delete the item.

Suppose, for example, you want to remove Microsoft Office Binder from the New menu. Right-click on the desktop, click **New**, and

choose Microsoft Office Binder. The resulting file is called, by default, **New Microsoft Office Binder.obd**—thus, **.obd** is the extension whose **ShellNew** entry you want to remove. Hold the **Shift** key while pressing **Del** to delete this file without sending it to the Recycle Bin. Now follow the instructions above to locate and delete the **ShellNew** entry for **.obd** files; Figure 3 shows this entry as displayed in **Regedit**.

The template filename specified in the **ShellNew** entry is **Binder70.obd**. To remove the template file using Explorer, open the **ShellNew** folder found in the Windows 95 folder, locate **Binder70.obd**, and delete it. It's safer, though, to leave the template file alone, in case you ever want to restore the deleted item to the New menu.

Cautious users may prefer a less permanent method for suppressing file types from the New menu. Try this: Launch **Regedit** and navigate as described above. But instead of deleting the **ShellNew** key, rename it to something like **ShellNewX**. The offending file type no longer appears on the New menu, but you can restore it to favor simply by renaming the same key back to **ShellNew**.

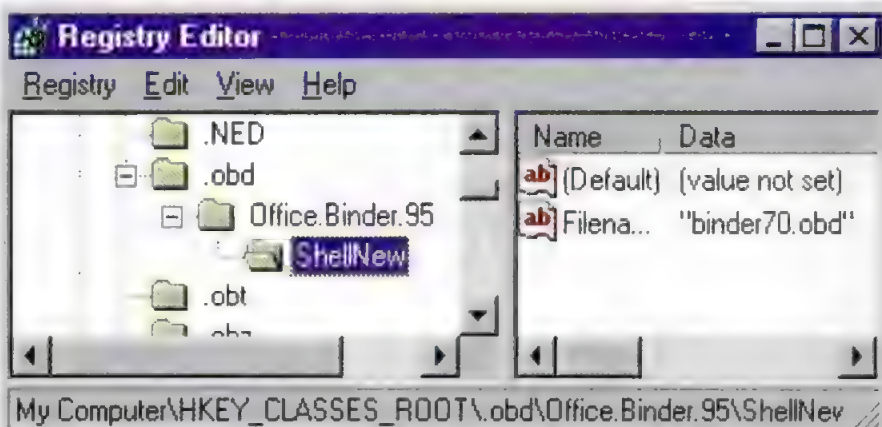
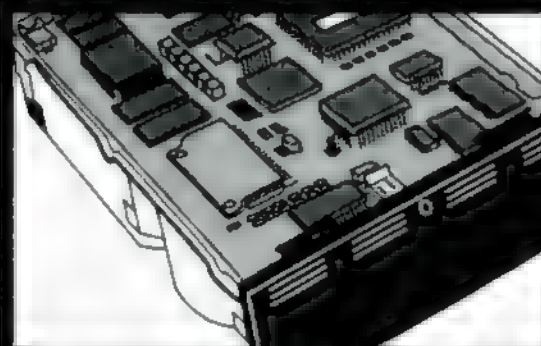
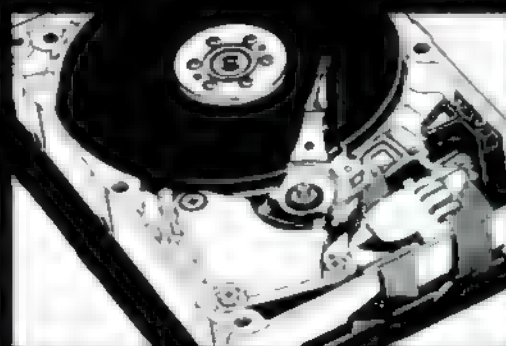
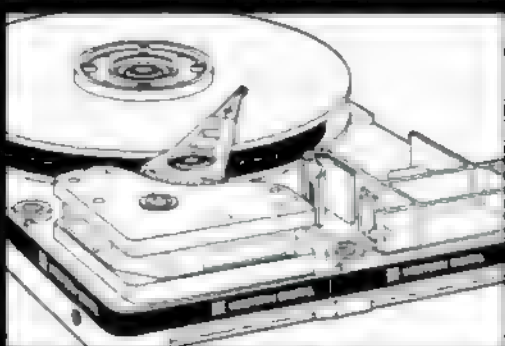


FIGURE 3: The **ShellNew** key causes the corresponding file type to appear on the desktop's New menu; the string value called **Filename** names the template for that file type.

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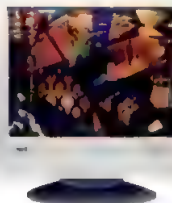
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I have an internal 14.4-Kbps fax modem. I'd like to upgrade to a 28.8-Kbps modem soon and possibly to ISDN in the near future, but my system has the "old" UART chip and I'm not sure whether I can upgrade it on the motherboard. I also don't know whether I should buy an internal or external modem (I'd prefer an internal).

If I were to upgrade by buying a new serial card adapter with a new UART, would an internal modem use the new one or the old? (I have the ability to disable the on-board COM ports through the BIOS.) I assume an external modem would use the new UART.

Also, is there any way (besides swapping cables) to use both a 28.8 analog modem and an ISDN modem? My mouse is already hooked to COM2. The modem is connected to COM1, and I'd rather avoid the problems of using COM3 or COM4—I've tried that before!

NEIL RUDISH, Canton, Michigan

PC MAGAZINE: First let's make sure we have the facts in order: An internal modem will have its own UART integrated into its circuitry, so you don't need to worry about upgrading the motherboard UART to use a new internal modem. An external modem, on the other hand, relies on the serial port in the computer (the UART is part of the serial port). And the UART that the external modem uses completely depends on the serial port it's connected to: If you plug a new external modem into your old serial port, the modem will use the old UART.

So, if you were going to use an external modem, you'd want to upgrade to a 16550 UART; an inexpensive serial card with this support will cost \$20 or less. You'd then disable the COM1 port on your system's motherboard and simply replace your old internal modem with the new serial card.

When you add ISDN to the mix, there are two connections to consider: the serial connection and the phone line. For the phone line, you'll find that some modems—such as the Motorola BitStream—have an analog jack in the back that you can use to connect a modem or telephone to your ISDN line. This

means that you may be able to plug your analog modem directly into the ISDN modem, without the need for an additional phone jack.

For the serial connection, you'll still need a serial port on your computer. If you don't want to hassle with more than two serial ports in your system, you have two options. One is to get a high-speed serial port and an external 28.8-Kbps modem now; when you add ISDN, get an external ISDN modem and a serial switch box. (It is unlikely that you'll be using both the ISDN and 28.8-Kbps modems at the same time.) The other route would be to get a bus mouse and card to free up your COM2—this could cost as little as \$30. You'd then have the option of getting an internal ISDN modem or a high-speed serial port and an external ISDN modem. You would need an available IRQ for the bus mouse, but this may be easier than trying to solve the problems of configuring three serial ports in one system.

—Alfred Poor

Room Service

One of our employees travels a lot with a laptop computer, and he often needs to send data back to the office via modem. Over the last few months, he has destroyed four PC Card

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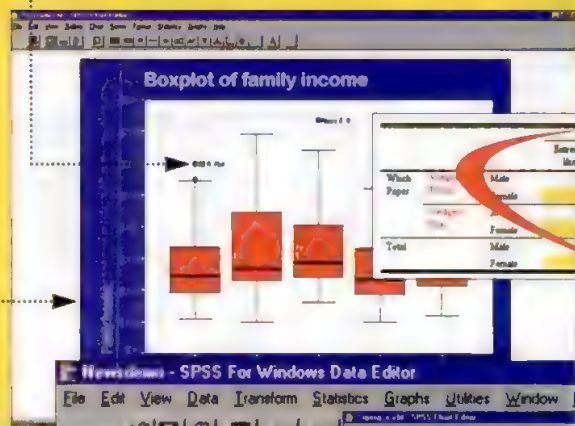
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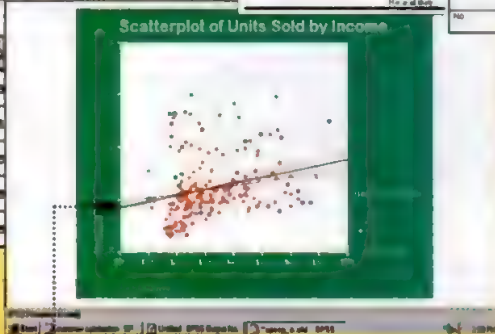
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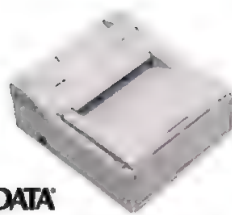
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modem cards. He plugs into a data port on a phone or wall jack and not only can he not get a dial tone, the modem is then ruined. At first I thought there might be something wrong with the slot, but then the same thing happened with a different machine. Do you have any idea what might be causing this and how to keep it from happening again?

ROB PERSCHAU, Kansas City, Missouri

PC MAGAZINE: Chances are good that your traveling colleague is plugging into hotel phone lines that are connected to digital phone systems. Just because your modem's telephone cord fits a jack in the wall doesn't mean you can plug it in safely.

Most telephones use analog signals, including the standard phone jacks we use at home. But some hotel, motel, and office telephone systems use digital signals that can instantly fry a standard modem. (ISDN is starting to change all this, but we're probably still a long way from seeing ISDN jacks in the average motel room.)

One solution is to avoid plugging a modem into a jack unless it is clearly labeled as a data port or intended for a modem. More and more hotels provide these as separate jacks on the wall or, even better, as special jacks on the side of the telephone. But they aren't available everywhere, unfortunately, and some hotels feature them only in certain rooms. So you should add this to your reservation check list along with your other preferences to make sure it's available when you need it.

You can also use an adapter that lets you plug analog modems into digital phone systems—for example, the \$149 Linc Up II, from Black Box Corp. (417-746-5500), and the \$159 Konexx Model 111, from Unlimited Systems (800-275-6354). These devices let you safely plug your modem into a digital phone system.—*Alfred Poor*

Cold Treatment for Hard Disks

I normally leave my computer running at all times, with no problems. Whenever I lose power, though, the hard disk usually refuses to spin back up. I have to keep switching the power on and off until the disk finally starts up again.

The last time this happened, I was unable to get the drive to spin up no matter what I did. I had heard that putting an unresponsive hard disk in the freezer sometimes helps to restore it, so, in desperation, that's what I did. I put the disk in the freezer for about 2 hours, just long enough to get it ice cold but not long enough to actually freeze the components. I then plugged the drive back in and was surprised to find that it worked: The drive came

right up to speed on the second attempt! Can you tell me why this would help?

GREG SADDLER, Atlanta, Georgia

PC MAGAZINE: When an old hard disk won't spin up, a deep-freeze treatment, oddly enough, can treat two of the possible causes: tired, old lubricants and stiction—where the read/write head actually gets stuck on the surface of the disk's platter. There is a more permanent fix for the first problem, but the second can be cause for concern.

The bearings in a disk drive are lubricated, and the oil grows stickier over time as it wears out. As long as the drive is warm and spinning, the bearings work fine, but when the oil cools, the motor shaft may get stuck. The deep-freeze technique can cause the mechanical parts to contract, breaking the bonds and allowing the motor to spin up to speed. As long as you can get the disk spinning, you don't really have anything to worry about, but you

When an old hard disk won't spin up, a deep-freeze treatment, oddly enough, can treat two of the possible causes.

might want to give the motor spindle a drop or two of penetrating oil or light machine oil to help thin out the thickened old lubricants.

The other problem is less benign. Older hard disks let the read/write heads come to rest in contact with the hard disk platter's surface when the power is turned off. That's why it was so important to "park" the heads of those older drives before turning the machines off, so that the heads would be moved to a safe portion of the disk where no data was stored. When the disk was started, the heads would drag around and around on this point until there was sufficient air pressure to fly the heads above the platter's surface.

This dragging of the heads along the platter inevitably damages both the disk and the heads themselves. Debris often builds up between the platter and head, causing the two to get stuck together. The freezer fix again uses contraction to break the bond; it is a better approach than the "whack it with a hammer" solution that is sometimes recommended. Unfortunately, there's no permanent solution to this problem; because it can be a sign of potentially fatal wear within the drive, take extra care to keep your backups current if you suspect that stiction is behind your disk's reluctance to spin.—*Alfred Poor*

OPERATING ENVIRONMENTS

Expanding Your Environment



I'm having a problem using NO.BAT (described in the User-to-User column of April 25, 1995). I typed it in as directed, but I get an "Out of environment space" message every time I try to run it. What does the message mean and why am I getting it?

J.R. WARRICK, via Internet

PC MAGAZINE: The environment is an area of memory DOS reserves for environment variables. These variables are used to define certain aspects of operating system or other program behavior.

Some environment variables, such as the PATH and PROMPT variables, belong to DOS itself. PATH tells DOS which directories to search for executable program files, and PROMPT controls the appearance of the DOS prompt. Batch files can define environment variables of their own for use as temporary storage. You use the SET command to create an environment variable (SET name=value) or to clear one from memory (SET name=). To reference the value of an environment variable, you enclose it in a pair of percent signs:

ECHO Value of variable name is %name%

The environment is small by default, however. It's just a few hundred bytes—the precise value depends on your particular DOS version. DOS can expand the environment only for the primary command processor—that is, the one started at boot-up, not a Windows DOS box or "shell-to-DOS" option from a program. And it can do so only if no RAM-resident programs have been loaded. In general, once the environment is full of variables, any attempt to create another one fails and will trigger the "Out of environment space" error.

Like many batch files, NO.BAT keeps its environment variables to itself. It uses them internally and, when finished, deletes them. There's an easy way to get all the environment space you need for such a self-contained batch file. Simply run the batch file under a secondary command processor that has a bigger environment. For example, you might enter

```
COMMAND /E:1024 /C NO *.ZIP DEL *.*
```

The /E:1024 switch gives the secondary command processor 1,024 bytes of environment space, and the /C switch tells it to execute the command that follows and then terminate. The only time you can't use this

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technique is when the batch file must return a value in a particular environment variable, as all changes to the environment vanish when the secondary command processor terminates.—Neil J. Rubenking

Finding the Nearest Printer

In order to determine the location of a LAN workstation and attach the closest printer to it, I set the volume label on the boot drive to the room number containing the printer. Then I used a batch file to put the volume label into an environment variable. Every now and then, however, our college-student users change those volume labels (just accidentally, of course), so I'd like to set the variable from the contents of a read-only file. Can you help me do this?

HERBERT E. DONUS,
Tortola, British Virgin Islands

PC MAGAZINE: Rather than attempt to load a file into an environment variable, you can create a file that sets the variable itself. Here's what you do: Create a batch file called SETROOM.BAT in the root directory of each workstation. In this batch file, place a single line, such as "SET ROOM=1234," where "1234" is replaced by the room number containing the closest printer. Use the ATTRIB command to set the hidden and read-only attributes for that file.

DOS won't display hidden files in a normal DIR listing, but it has no problem executing them. Just CALL C:\SETROOM.BAT to get the ROOM environment variable set to the correct room number. Then use the variable just as you were using the room number extracted from the volume label.

Of course, your students could still locate and trash the SETROOM.BAT files, just as they've changed the volume label. But it would be harder to pass off this degree of mischief as an accident!—Neil J. Rubenking

File Manager's New Math

Here's a problem no one seems to be able to help me with. I use Windows 3.11, and the status bar at the bottom of File Manager always shows the incorrect size of the file that is highlighted. I noticed this first when the status bar indicated that a 1.44MB floppy disk had only 1.38MB of free space available. I can successfully copy 1.44MB to the floppy disk, but it's really aggravating to always have to add up the sizes of various files. Is there a way to correct this so that the status bar will show the correct size of the selected file(s)?

AARON WIECZOREK, via ZD Net

PC MAGAZINE: In the time-shrouded history of computer science, someone decided that when referring to computer memory or disk space, the meanings of the familiar prefixes *kilo* and *mega* would change. Thus one kilobyte came to mean 1,024 bytes (2 to the 10th power), not 1,000 bytes. And one megabyte is 1,048,576 bytes (2 to the 20th power), not 1,000,000. This decision has been a source of confusion ever since.

A so-called 1.44MB floppy disk actually holds 1,457,664 bytes. Divide that capacity by 1,048,576 (one megabyte) and you get 1.39. It's not clear why File Manager reports 1.38 instead, but the difference is certainly not as great as you expected. Similarly, a file that's 45,568 bytes in size will be reported as 44.5K. That's not an error or a slipped digit, it's the result of dividing the size by 1,024 rather than 1,000.

In short, there's nothing wrong with File Manager except perhaps a slight underestimation of the disk's total capacity. It's just a matter of remembering that you divide the total number of bytes by 1,024 (not 1,000) to get kilobytes and by 1,048,576 (not 1,000,000) to get megabytes.—Neil J. Rubenking

Breaking out of OS/2

Help! OS/2 is stuck in a loop, and I can't break in and get control of my system. I was running a program and OS/2 locked up. I was able to reboot and thought that would be the end of it. But OS/2 keeps trying to restart the program, which then locks it up again. How can I break the cycle and get control of my system again?

GEORGE AXLE,
Hoosic Falls, New York

PC MAGAZINE: One of OS/2's features is the ability to remember all programs that were running when you shut down and to start them up automatically during the next boot. Users often choose to leave programs running when they shut their systems down to take advantage of this feature. Unfortunately, when a situation like yours occurs, this feature ends up looking more like a bug.

To stop this automatic program start-up, you need to change a statement in your CONFIG.SYS file. The format for the statement is

SET RESTARTOBJECTS=

The possible parameters are YES, NO, STARTUPFOLDERONLY, and REBOOTONLY. The default for this statement is YES, so if the statement doesn't appear in CONFIG.SYS, all running objects are restarted. If you set the statement to NO, nothing will be started after a boot, including programs you've put in your Startup folder. If you want to start only the items in your Startup folder but not any other programs that might have

been running, use STARTUPFOLDERONLY.

The last parameter refers to a situation described in the Solutions column of December 5, 1995. OS/2's Workplace Shell sometimes detects internal problems and resolves them automatically by "rebooting" itself without the user ever knowing about it. When this occurs, though, the Workplace Shell restarts things just as if a complete system boot had taken place. If you use the REBOOTONLY parameter, the Workplace Shell will not restart programs and folders automatically after this kind of reset. In most situations, the best idea is to add the following line to CONFIG.SYS:

SET RESTARTOBJECTS=STARTUPFOLDERONLY

Move anything you want to start automatically to the Startup folder (you'll find it in the OS/2 System folder).

How do you make this change if you can't get control of OS/2 in the first place? You have two choices. First, you could boot from the installation disks. After you've been prompted to insert disk 1, you'll see a welcome panel. Pressing Esc then takes you to an OS/2 command prompt where you can use the command line editor TEDIT located on that disk to change your CONFIG.SYS file.

An easier technique is to keep an eye on your system during its next boot cycle. As soon as the colored desktop background appears but before any icons are placed on the desktop, press the left-hand Ctrl and Shift keys and F1 at the same time. This tells the Workplace Shell not to restart any objects, thus breaking the cycle you're stuck in.

—Brian Proffit

WORD PROCESSING

Combining Repeating Text and Sequential Numbers in Word



I needed to create sequentially numbered tickets for a New Year's Eve party. Microsoft Word's AutoNum field worked well for generating the numbers, but I had to enter the text separately for each ticket. And when I needed to make changes, I had to make corrections on each ticket.

Making the corrections is only a minor chore, thanks to global search and replace, but I wonder if there's a way to use a field to insert the repeating text. That would let me enter any changes once, then update the field throughout the file.

WILLIAM E. KING, Phoenix, Arizona

PC MAGAZINE: The field you're looking for is the Ref field, which inserts text you've defined as a bookmark. Start by entering the text you

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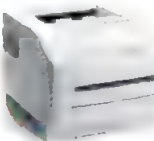
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2550MB	Caviar	10ms	128	5,200	3.5" 1"H	Enhanced IDE	WD32500A	429.99

Seagate

Mobile Products								
810MB	Marathon	16ms	120	4,500	2.5" 10 15m 2.5"	Fast ATA-2	ST9816AG	\$449.99
Desktop PC Products								
541MB	Cabo 541	14ms	32	3,600	3.5" 1"H	Fast ATA-2	ST3541A	\$179.99
631MB	Medalist XE	14ms	120	3,811	3.5" 1"H	Fast ATA	ST3630A	179.99
850MB	Cabo 850	14ms	32	3,600	3.5" 1"H	Fast ATA-2	ST3851A	199.99
1083MB	Medalist SL	10.5ms	128	5,400	3.5" .75"H	Fast ATA-2	ST51080A	219.99
1282MB	Medalist SL	10.5ms	128	5,400	3.5" .75"H	Fast ATA-2	ST51270A	239.99
2113MB	Medalist	10.5ms	128	5,400	3.5" 1"H	Fast ATA-2	ST32140A	349.99

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2.5" Drives								
810MB		13ms	128	4,200	2.5" 12.7m	IDE	MK1926FCV	\$449.99
1300MB		13ms	128	4,200	2.5" 12.7m	IDE	MK1301MAV	699.99
1300MB		13ms	128	4,200	2.5" 19m	IDE	MK2720FC	599.99
2100MB		13ms	128	4,200	2.5" 19m	IDE	MK2101MAN	CALL

Fujitsu

1080MB		12ms	64	4,500	3.5" 1"H	Fast ATA-2	FJ1614A	\$215.99
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Quantum

850MB	Trailblazer	14ms	128	4,500	3.5" 1"H	Fast ATA-2	QUTR850A	\$209.99
1280MB	Fireball	12ms	128	5,400	3.5" 1"H	Fast ATA-2	QUBF1280A	259.99
1708MB	Sirocco	11ms	128	4,500	3.5" 1"H	Fast ATA-2	QUSR1708A	CALL
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1336MB	Durango	11ms	128	4,500	3.5" 1"H	Enhanced IDE	MX71336A	\$249.99
1670MB	Durango	11ms	128	4,500	3.5" 1"H	Enhanced IDE	MX71670A	289.99
2004MB	Durango	11ms	128	4,500	3.5" 1"H	Enhanced IDE	MX72004A	359.99
540MB	Deskstar	12ms	256	4,500	3.5" 1"H	Fast ATA	IB06H7141	185.99
1080MB	Deskstar	10.5ms	512	5,400	3.5" 1"H	Fast ATA	IB94G3186	269.99

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AD2940UW	\$319.99

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• Up to 133MB/sec. PCI Bus, 40MB/sec. SCSI Bus	
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USR Winmodem 28.8/14.4 Int MBUSP1125	149.99
USR Sportster 28.8/14.4 Int MBUSP0141	179.99
USR Sportster 28.8/14.4 Ext MBUSP0140	269.99
Motorola Btriser Pro ISDN Ext MBUSP0140	155.99
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Iomega 3.2GB Int. Travan Floppy TBT4000K	299.99
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SCSI Hard Drives

Capacity**	Model	Access	Cache	RPM	Form/Height	Interface	Product Code	Bare Kit
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Desktop PC Products								
1080MB	Medalist SL	12.5ms	128	5,400	3.5" .75"H	Fast SCSI-2 A/V	ST51080N	\$239.99
Workstation/Server Products								
2149MB	Hawk 2XL	9ms	512	5,411	3.5" 1"H	Fast SCSI-2 A/V	ST32151N	649.99
4294MB	Hawk 4	9ms	512	5,411	3.5" 1"H	Fast SCSI-2 A/V	ST15232N	999.99
High-End Workstation/Server								
2147MB	Barracuda 2LP	8ms	512	7,200	3.5" 1"H	Fast SCSI-2 A/V	ST32550N	\$799.99
2147MB	Barracuda 2LP	8ms	512	7,200	3.5" 1"H	Fast Wide SCSI A/V	ST32550WC	829.99
2147MB	Barracuda 2LP	8ms	512	7,200	3.5" 1"H	Fast Wide SCSI A/V	ST32550WC	849.99
4294MB	Barracuda 4	8ms	1,024	7,200	3.5" 1"H	Fast SCSI-2 A/V	ST15150N	1,155.99
4294MB	Barracuda 4	8ms	1,024	7,200	3.5" 1"H	Fast Wide SCSI A/V	ST15150WC	1,249.99
4294MB	Barracuda 4	8ms	1,024	7,200	3.5" 1"H	Fast Wide SCSI A/V	ST15150WC	1,250.99
9090MB	Elite 9	11ms	1,024	5,400	5.25" FH	Fast SCSI-2 A/V	ST410800N	2,175.99
9090MB	Elite 9	11ms	1,024	5,400	5.25" FH	Fast Wide SCSI A/V	ST410800W	2,185.99

Fujitsu

2100MB	Allegro	8.9ms	512	7,200	3.5" 1"H	Fast SCSI-2 A/V	FJ2915S	\$659.99
4200MB	Allegro	8.9ms	512	7,200	3.5" 1"H	Fast SCSI-2 A/V	FJ2934S	959.99

68 Pin Wide SCSI Drives

2100MB	Allegro	8.9ms	512	7,200	3.5" 1"H	Fast Wide SCSI-2 A/V	FJ2915W	\$659.99
4200MB	Allegro	8.9ms	512	7,200	3.5" 1"H	Fast Wide SCSI-2 A/V	FJ2934W	959.99

MICROPOLIS

2100MB	Taurus	8.5ms	512	7,200	3.5" 1"H	Fast SCSI-2	MC4221S	\$659.99
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4300MB	Capricorn	8.5ms	512	7,200	3.5" 1"H	Fast SCSI-2	MC3243S	1,029.99
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9100MB	Scorpio	12ms	512	5,400	5.25" FH	Fast SCSI-2	MC1991	1,999.99
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AV Gold Series Drives

2100MB	Taurus	8.5ms	512	7,200	3.5" 1"H	Fast SCSI-2 A/V	MC4221AV	\$759.99
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4300MB	Capricorn	8.5ms	512	7,200	3.5" 1"H	Fast SCSI-2 A/V	MC3243AV	1,139.99
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9100MB	Scorpio	12ms	512	5,400	5.25" FH	Fast SCSI-2 A/V	MC1991AV	2,139.99
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68 Pin Wide Drives

2100MB	Taurus	8.5ms	512	7,200	3.5" 1"H	Fast Wide SCSI-2 A/V	MC4221AVW	\$899.99
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4300MB	Capricorn	8.5ms	512	7,200	3.5" 1"H	Fast Wide SCSI-2 A/V	MC3243AVW	1,249.99
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9100MB	Scorpio	12ms	512	5,400	5.25" FH	Fast Wide SCSI-2 A/V	MC1991AVW	2,229.99
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Quantum

850MB	Trailblazer	14ms	128	4,500	3.5" 1"H	Fast SCSI-2	QUTR850S	\$219.99
1080MB	Fireball	12ms	128	5,400	3.5" 1"H	Fast SCSI-2	QUBF1080S	299.99
1280MB	Fireball	11ms	128	5,400	3.5" 1"H	Fast SCSI-2	QUBF1280S	329.99
2150MB	Atlas	8ms	1,024	7,200	3.5" 1"H	Fast SCSI-2	QUXP3125S	799.99
4300MB	Atlas	8ms	1,024	7,200	3.5" 1"H	Fast SCSI-2	QUXP3430S	1,099.99

2100MB	Ultrastar	7.5ms	512	7,200	3.5" 1"H	Fast SCSI-2	IB94G3054	\$1,145.99
4500MB	Ultrastar/XP	8ms	512	7,200	3.5" 1"H	Fast SCSI-2	IB94G3196	1,599.99
5310MB	Ultrastar	8ms	512	5,400	3.5" 1"H	Fast SCSI-2	IB94G3787	1,399.99

68 Pin Wide SCSI Drives

2100MB	Ultrastar	7.5ms	512	7,200	3.5" 1"H	Fast Wide SCSI-2	IB94G3055	\$1,219.99
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4500MB	Ultrastar/XP	8ms	512	7,200	3.5" 1"H	Fast Wide SCSI-2	IB94G3057	1,699.99
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5310MB	Ultrastar	8ms	512	5,400	3.5" 1"H	Fast Wide SCSI-2	IB94G3059	1,499.99
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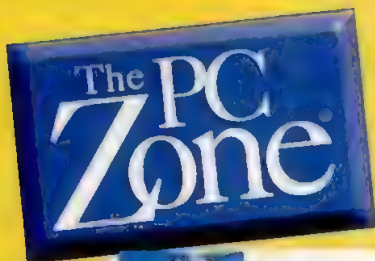
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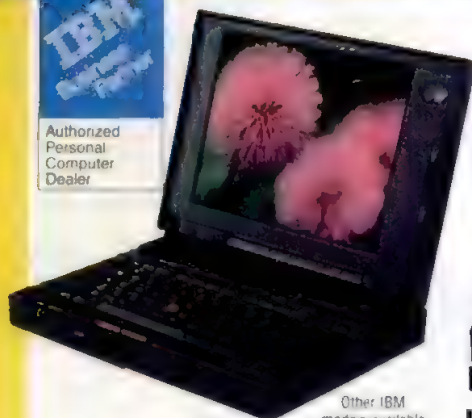
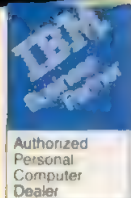


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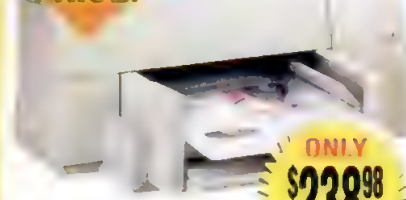
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Desktop 350	133MHz	1.2GB	#27945**	\$3232
Desktop 350	90MHz	850MB	#26522**	\$2312
Desktop 350	100MHz	850MB	#27916**	\$2542
Desktop 350	100MHz	850MB	#27917**	\$2312

*4X CD-ROM Drive

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Processor	Hard Drive	Screen	Order #	Price
90MHz	810MB	11.3" DSCAN	#27992	\$3138
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90MHz	810MB	11.3" Active	#27993**	\$4296

**Includes 4X CD-ROM

Options & Accessories	Order #	Price
VisionTek 8MB Upgrade	#28276	\$519.98
Lithium Ion battery pack	#25396	\$229.98
Optional 4X CD-ROM Drive	#28685	\$329.98

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TEXAS INSTRUMENTS

want repeated. Then select the text and choose Edit | Bookmark to open the Bookmark dialog box. Enter a name for the Bookmark in the Bookmark Name text box—Ticket, say—and choose the Add button to create the bookmark and close the dialog box.

Once you've created the bookmark, you can reproduce it with a Ref field as many times as you like. The most straightforward way to create the field is to type Ctrl-F9 to insert the field markers, which look like left and right curly braces. Then type Ref Ticket (assuming you named the bookmark Ticket) or simply Ticket between the braces so that the field reads {Ref Ticket} or {Ticket}. Finish up by hitting F9 to update the field. Assuming you have Word set to show field results rather than field codes, the field code should be replaced by a copy of the bookmarked text. If you still see the field codes, toggle Word to show field results instead by hitting Alt-F9 or by choosing Tools | Options, going to the View card, and making sure the Field Codes check box isn't checked.

After creating the Ref field, you can select it; choose Edit | Copy, then use Edit | Paste to paste as many copies as you need into the file. Then, if you need to make changes, you can make them to the original text at the beginning of the file, select the entire document with Ctrl-NumPad 5 (the 5 on the numeric keypad), and hit F9 to update all the Ref fields in the file at once.

Not so incidentally, you're better off using Word's Format | Bullets and Numbering command instead of AutoNum for automatic numbering, though you will have to be careful about how you insert paragraphs. Since Word will number every paragraph you add, you'll want each ticket to consist of only one paragraph. And that means you'll need to force new lines within each ticket with the new-line command (Shift-Enter) instead of a carriage return.

Assume, for example, that the tickets are large enough to hold five lines of text, and you want the ticket to take the form:

1001
New Year's Eve Party
\$10.00 per person
Dec. 31, 7 P.M.

The last line is left blank. For simplicity, I'll assume that the paper stock has room for one ticket across.

To create this ticket, start by entering the text, leaving a blank line for the number at the top and using the new-line command rather than the Enter key to create each new line. If you set Word to show paragraph returns (choose Tools | Options | View and make sure the Paragraph Marks check box is checked), you'll see the new-line code as a small, left-pointing arrow (←) and a true carriage return

as a paragraph mark (¶). At this point the file should look like this:

New Year's Eve Party ¶
\$10.00 per person ¶
Dec. 31, 7 P.M. ¶

Now select everything, including the carriage return at the end, and create a bookmark. Then choose Format | Bullets and Numbering, go to the Numbered card, select the first format on the first row, and choose modify to open the Modify Numbered List dialog box. Remove the period from the Text After box so the number won't be followed by a period. Set the starting number in the Start At box to an appropriate number such as 1001, and choose OK. Word will return you to the document, which should now include a ticket number on the first line.

If you move the cursor to the last line and hit Enter, Word will start a new paragraph and number it. Create the Ref field immediately after the number on the same line, hit F9 to see the field result, and you'll have a second ticket in the same format as the first. Next, select the field you just created, along with the paragraph return at the end of the ticket, and choose Edit | Copy. Then move the cursor to the blank line at the end of the ticket, hit return to start a new numbered paragraph, and use the Edit | Paste command to create as many tickets as you need.—M. David Stone

SPREADSHEETS

Filling in the Blanks in Excel



I recently imported a Lotus 1-2-3 spreadsheet containing several empty cells into Microsoft Excel. I would like to use Excel's Autosum feature to total up the values in each column, but Autosum doesn't seem to work correctly if there are blank cells in a column. Is there a way to fill all the empty cells with a value of \$0.00 (just for summation purposes) without hunting through the entire spreadsheet?

—OVERTON ISAACS, via the Internet

PC MAGAZINE: The following Visual Basic for Applications procedure should take care of your problem:

```
Sub FillBlanks()  
  For Each Cell In Selection  
    If Cell.Value = Empty Then  
      Cell.Value = 0  
      Cell.NumberFormat =  
        "=$#,##0.00";[Red]("$#,##0.00")  
    End If  
  Next Cell  
End Sub
```

Choose Excel's Insert Macro Module command, then type this code into the new macro sheet. Return to your worksheet and select the columns you imported from 1-2-3. Choose Macro from the Tools menu, select Fillblanks from the ensuing dialog box, and click Run. Your empty cells will fill with zeros formatted as you wanted using one of Excel's built-in currency formats.—Craig Stinson

DATABASES

Wrapping Text in FoxPro for MS-DOS



A problem occurs in FoxPro for MS-DOS 2.6 when you use streaming output with the ? or ?? commands and the STYLE clauses. When the output wraps, FoxPro switches the STYLE code back to normal, regardless of the style in use. This also happens when you print a Memo field if the Memo field wraps, and it happens even in the middle of an object that falls at the end of a wrapped line.

This causes a lot of difficulties, since I need to be able to produce camera-ready output. Can you help?

—NIKOLAUS E. WOLFF,
Hanover, New Hampshire

PC MAGAZINE: Microsoft suggested the workaround shown in Figure 1. You use the Xwrap function instead of the ? or ?? commands to output your strings to the current printer. The function uses the left and right margin settings (_LMARGIN and _RMARGIN) to anticipate where a wrap would occur and instead sends your string to the printer in pieces. That way the wrap doesn't happen and you don't lose the STYLE setting. You should be sure to use the SET PRINTER ON command before calling the function, as well as the SET PDSETUP TO command to assign the proper printer driver. Of course, you must use the SET PRINTER OFF command when you're done.

To use the function, send it three parameters: the string to print, a style clause, and whether you want the string to begin on a new line or not. For example, suppose you have a paragraph of text stored in the variable cString that you want to print in bold starting on a new line. To send it to the printer using the Xwrap function, you'd use the following:

```
=Xwrap( cString, "B", .T. )
```

Here "B" stands for bold and the .T. indicates that printing must start on a new line. You can download the Xwrap function from PC Magazine Online. Look for the file XWRAPPRG.

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Pentium 90MHz	9.5" True Color	8/720MB	\$3939

Tecra 700

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with PCI bus**

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Tecra 700

Processor	Screen	RAM/HD	Price
Pentium 120	11.3" Dual Scan	8MB/1.13GB	\$4679
Pentium 120	11.3" Active	16MB/1.13GB	\$5949



Satellite 2130CS/100CS

Satellite 2130CS/100CS

Processor	Screen	RAM/HD	Price
486DX4/75	10.4" Dual Scan	8/500MB	\$1599
Pentium 75	10.4" Dual Scan	8/500MB	1969*



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Satellite Pro 410

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- Lithium ion battery technology
- Built-in antenna for wireless communications

Processor	Screen	RAM/HD	Price
Pentium 90	11.3" Dual Scan	8/772MB	\$3199
Pentium 90	11.3" Active	8/772MB	4399

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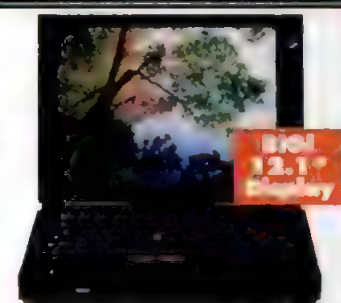
Processor	Screen	RAM/HD	Price
486DX4/75	10.4" Active	8/540MB	\$2599
486DX4/75	10.4" Active	8/540MB	3099*

*Features built-in 2X CD-ROM drive

ThinkPad 760

- Up to 120MHz Pentium with 32-bit Local bus
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- Built-in 28.8 fax modem
- SoundBlaster compatible audio & telephony
- Lithium ion battery technology

Processor	Screen	RAM/HD	Price
Pentium 90	10.4" Active	8/720MB	\$4999
Pentium 90	12.1" Active	8/720MB	5499
Pentium 120	12.1" Active	8/720MB	5699
Pentium 120	12.1" Active	8MB/1.0GB	5999
Pentium 90	12.1" Active	8MB/1.2GB	6699*
Pentium 120	12.1" Active	8MB/1.2GB	6899*



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Processor	Screen	RAM/HD	Price
486DX4/75	8.5" Dual Scan	8/340MB	\$2200
486DX4/75	9.5" Active	8/340MB	2500

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- 12.1" Active Matrix display with 65,000 colors
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- PCI Local bus Video - 1.5MB video memory
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- Optional 4X CD-ROM available

Processor	Screen	RAM/HD	Price
Pentium 133	12.1" Active	8MB/1.35GB	CALL



HP OmniBook 5500

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Processor Screen RAM/HD Price

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Pentium 120	10.4" Active SVGA	8MB/1.1GB	CALL
Pentium 133	10.4" Active SVGA	8MB/1.4GB	CALL

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Processor Screen RAM/HD Price

Pentium 75	10.1" Active	8/810MB	\$3799+
Pentium 90	10.4" High Res.	8/810MB	4499
Pentium 90	10.1" Active	8/810MB	4499+
Pentium 120	10.4" High Res.	8MB/1GB	4999

+ Features built-in 4X CD-ROM drive

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Contura 430

Processor Screen RAM/HD Price

486DX4/100	10.4" Dual Scan	8/720MB	\$2369
486DX4/100	10.4" Active	8/720MB	2939

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Pentium 75	11.3" Dual Scan	8/810MB	4439
Pentium 75	10.4" Active	8/810MB	4729
Pentium 90	10.4" Active	8/810MB	5339
Pentium 90	10.4" Active	8/810MB	5599*
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Processor	RAM/HD	C-20M	Price
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Pentium 133	8MB/1.2GB	6X	CALL
Pentium 150	8MB/1.2GB	6X	CALL
Pentium 133	8MB/1.2GB	6X	CALL
Pentium 120	16MB/1.6GB	6X	CALL
Pentium 133	16MB/1.6GB	6X	CALL
Pentium 150	16MB/2GB	6X	CALL
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Pentium 100	16MB/1.2GB	6X	\$2020
Pentium 133	16MB/1.2GB	6X	2150
Pentium 150	16MB/1.2GB	6X	2370
Pentium 100	16MB/1.6GB	6X	2050
Pentium 133	16MB/1.6GB	6X	2300
Pentium 150	16MB/2.1GB	6X	2640
Pentium 166	16MB/2.1GB	6X	2830

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Processor	RAM/HD	C-20M	Price
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Pentium 100	8MB/1.2GB	4X	1759
Pentium 100	16MB/1.6GB	4X	2099
Pentium 120	16MB/1.6GB	4X	2299
Pentium 133	16MB/1.6GB	4X	2499
Pentium 150	16MB/1.6GB	4X	2599
Pentium 166	16MB/1.6GB	4X	2799

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5x86 100MHz	10.4" Dual Scan	8/515MB	2200*
Pentium 75	11.3" Dual Scan SVGA	8/515MB	CALL
Pentium 100	11.3" Dual Scan SVGA	8/810MB	CALL

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Pentium 75	10.4" Active	1.2GB	3699

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AST Ascentia J

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Processor	Screen	RAM/HD	Price
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Pentium 100	10.4" Dual Scan SVGA	8/800MB	2840
Pentium 100	10.4" Active Matrix SVGA	8/800MB	3120

Ascentia 950N

Processor	Screen	RAM/HD	Price
Pentium 75	10.4" Active	8/800MB	\$2560
Pentium 75	10.4" Active	8MB/1.2GB	2880
Pentium 90	10.4" Active SVGA	8/800MB	3430
Pentium 90	10.4" Active SVGA	8MB/1.2GB	3750
Pentium 120	11.8" Active SVGA	8/800MB	4469
Pentium 120	11.8" Active SVGA	8MB/1.2GB	4849

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Pentium 75	8/540MB	5/5	1509
Pentium 90	8/540MB	3/3	1529
Pentium 90	16/850MB	5/5	2039
Pentium 100	16/850MB	3/3	2069
Pentium 100	16/850MB	5/5	2129

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```
*****
* FUNCTION Xwrap                                FoxPro for MS-DOS 2.6
* Prints a character string using the STYLE clause.
* Expects _WRAP to be .T., and uses _LMARGIN
* and _RMARGIN to anticipate a word wrap so
* the text doesn't wrap, losing the current
* STYLE clause.
*
* Parameter 1 - The string to be printed
* Parameter 2 - A string that defines the STYLE clause. An
*               empty string will default to Normal
* Parameter 3 - .T. to output the string on a new line
*               (?), or .F. to continue on the
*               same line (?). Defaults to .T.
*****
FUNCTION xwrap
PARAMETER instring, outstyle, newline
PRIVATE nextspace, outstring, fromcol
IF TYPE('outstyle') = 'L' ;
    OR EMPTY(outstyle)
    outstyle = "N"
ENDIF
IF PARAMETERS() < 3
    newline = .T.      && Default to newline if not
                       && explicitly .F.
ENDIF
```

```
outstring = ""
IF newline
    ?
ENDIF

* In case some text is already on this line
fromcol = IIF(_pcolno > _lmargin, _pcolno, _lmargin)

DO WHILE LEN(instring) > 0
    nextspace = IIF(AT(" ",instring)>0,AT(" ",instring),
    LEN(instring))
    *
    * If the next word would wrap
    *
    IF fromcol + LEN(outstring) + nextspace > _rmargin
    ?? outstring style (outstyle) AT (fromcol)
        outstring = ""
        ?                                && Wrap
        fromcol = _lmargin              && Reset
    ENDIF
    outstring = outstring + LEFT(instring, nextspace)
    instring = RIGHT(instring, LEN(instring) - nextspace)
ENDDO
?? outstring style (outstyle) AT (fromcol)
RETURN
```



FIGURE 1: Use this function in FoxPro for MS-DOS to send strings to the printer without losing your STYLE clause setting.

Microsoft concedes that it has no plans to further upgrade the MS-DOS product, at least as of this writing.—*Sal Ricciardi*

Leap Year Recap

The Leapyr function in the column of November 21, 1995, was indeed somewhat long, but your faster technique also seems a bit involved. Why won't the following leap year test do the trick?

```
IF MOD(YEAR(date),4) = 0
    * It's a leap year
ELSE
    * It's not a leap year
ENDIF
```

I know that for some year in the future this divide-by-4 rule won't work, but for now it's simpler.

JOHN A. DIXON,
Grass Valley, California

PC MAGAZINE: There's almost never a good reason to write a routine that will break in the future, even if the future is a long way away. You might make an exception for a true emergency when no alternative exists, but otherwise it's poor form and a bad habit to get into.

A leap year by definition is more than just a year that is evenly divisible by 4. That's

why the divide-by-4 logic is no good. A leap year is one that is evenly divisible by 4 and, if it's a century, also divisible by 400. This means 1600 is a leap year because it's evenly divisible by 4 and by 400. But 1700 is not because it fails the 400 test. 2000 is a leap year, but 2100 is not, and so it goes. The simple divide-by-4 logic would erroneously consider 2100 a leap year, and that's only 104 years away! I bet Cobol code will still be running then.

According to legend and the Microsoft Encarta 1996 Encyclopedia, the leap year came about in 45 B.C. when Julius Caesar decided to use a solar calendar. The Julian calendar that resulted fixed the normal year at 365 days and the leap year—every fourth year—at 366 days. The Julian calendar also introduced the order of the months and days of the week as they exist in present-day calendars.

The Julian calendar was slightly longer than the solar year, however, resulting in an accumulated discrepancy that, when corrected in 1582, required 10 days to be dropped from the calendar. (I'd drop the April 15th tax deadline myself.) To try to account for any additional discrepancy, Pope Gregory XIII instituted the Gregorian calendar, which specified that century years would not be leap years unless they were evenly divisible by 400. Today most of the Western world and parts of Asia use the Gregorian calendar.

Which brings us to the function originally published in the issue of November 21:

```
FUNCTION IsLeap
PARAMETER dDate
RETURN IEMPTY(CTOD("02/29/" +
STR(YEAR(dDate))))
```

This is the recommended technique in FoxPro for checking whether a particular year is a leap year.—*Sal Ricciardi* □

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21PS	004906	1639	

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Labtec			
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LCS 1024 Speakers	006253	65	
LCS-3010 Speakers	006250	79	

Panasonic			
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3COM			
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BOCALANcard 2000T Adapter	005207	35	

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EtherExpress Pro/100 PCI Adapter, RJ-45	008950	149	
EtherExpress XL Print Server, BNC	002129	465	

Megahertz			
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TravelMate 5000 P5-75, Dual Scan	008831	2319	
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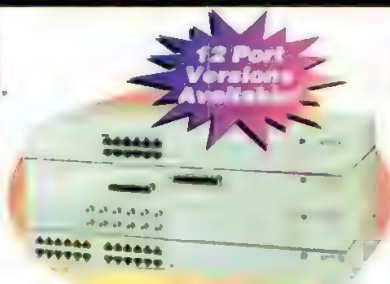
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ML320 P-emark 3410
ML321 OL600e
ML380 OL610e/PS
ML395 OL610e
ML320 OL610e
ML521 OL610e
ML590 OKJET 2010

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BJC70 color 353.66 BJC410C
BJC210

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Adaptec 1542CP SCSI Master Kit
Adaptec AVA1505 SCSI-2 CD Kit
Adaptec 2847 VLB SCSI 2
Adaptec PCI Ultra Wide SCSI Kit
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V 34 28.8 internal w/fax
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Hayes

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ACCURA 144 external w/fax
ACCURA 288 V 34 internal w/fax
ACCURA 288 V 34 external w/fax
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V 34 28.8 internal w/fax
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U.S. Robotics 14.4K
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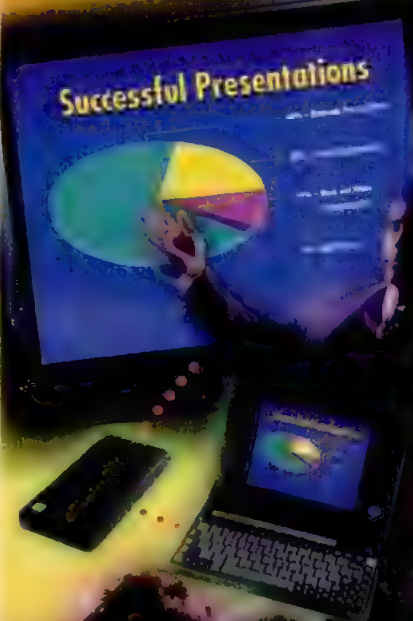
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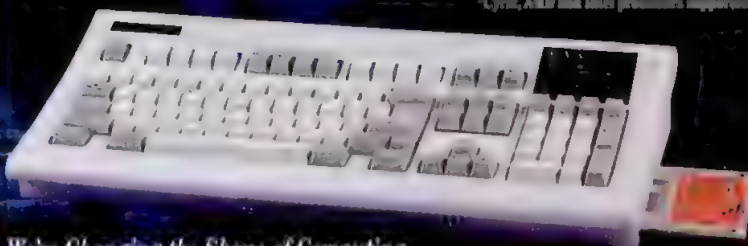
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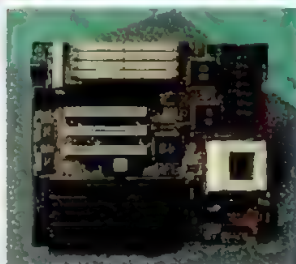
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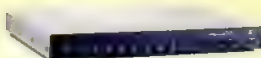
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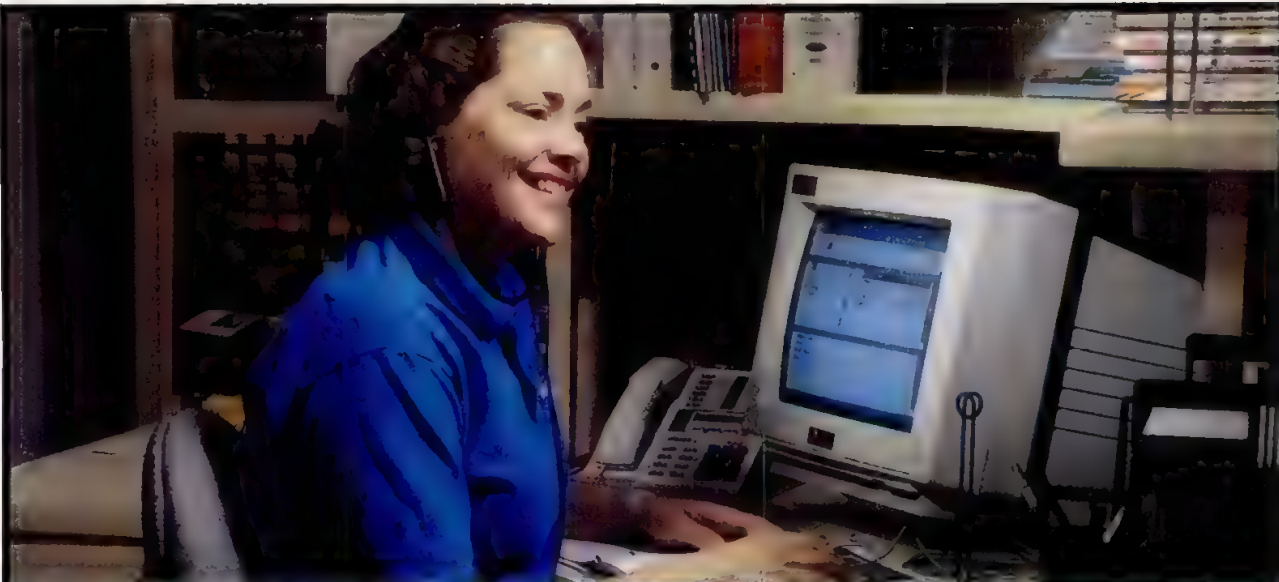
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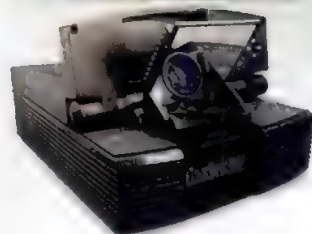
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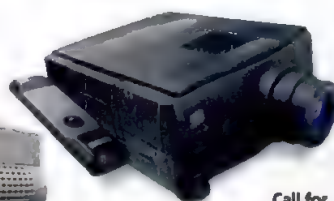
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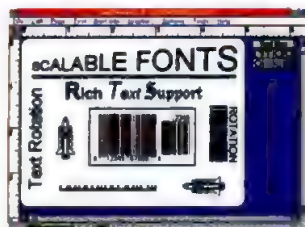
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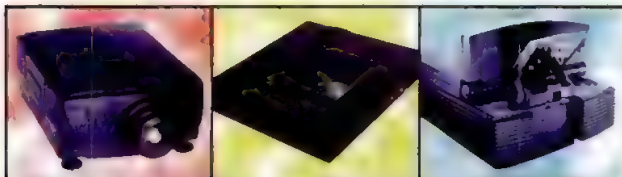
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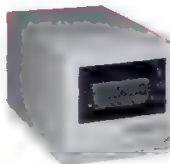
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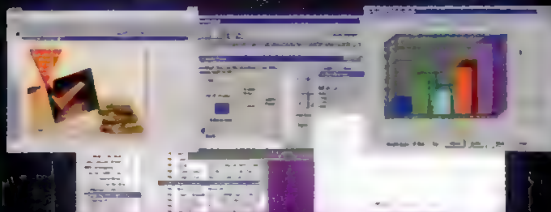
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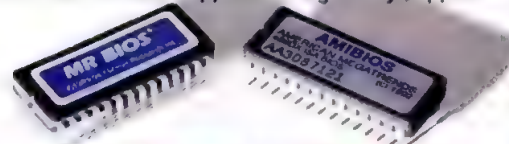
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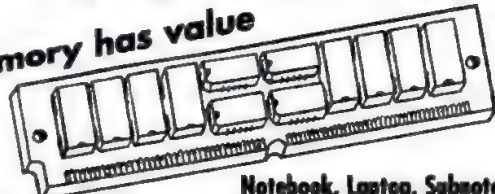
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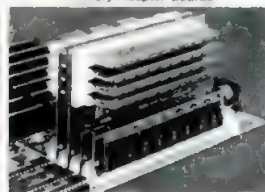
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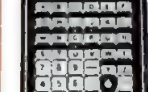
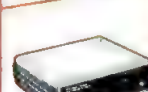
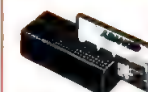
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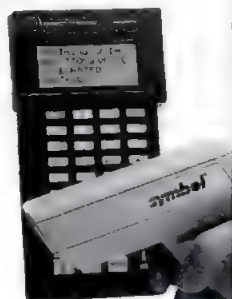
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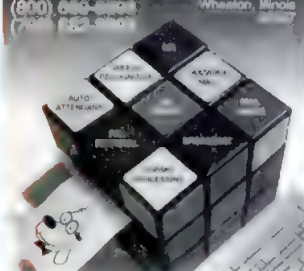
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SUMMARY NOTICE OF CLASS ACTION AND PROPOSED SETTLEMENT

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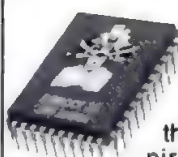
The purpose of this summary notice is to inform all Class Members of the proposed settlement of the lawsuit brought against Synchronys Softcorp. in the Circuit Court of Cook County, Illinois. As explained in detail in a notice of class action and proposed settlement which will be distributed by mail (the "Mailed Notice"), if you purchased SoftRAM or SoftRAM95 on or before March 15, 1996, you are a member of the Settlement Class and your rights will be affected by the legal proceedings in this action. You are encouraged to read this Notice and the Mailed Notice in their entirety. You have a right to request exclusion from the Settlement Class but you must do so by June 15, 1996 by following the procedures outlined in the Mailed Notice. If you do not request exclusion from the Settlement Class, the terms of the settlement and judgment will be binding as to you.

Generally, the proposed settlement, which has been preliminarily approved by the Court, provides that in exchange for releasing all claims against Synchronys Softcorp. and its distributors and retailers in connection with SoftRAM or SoftRAM95, Class Members may be entitled to (1) a full refund or a free software upgrade or free software, at the Class Member's election, and (2) coupons which may be used in connection with the purchase of other Synchronys products. A hearing will be held on June 24, 1996 at 10:30 a.m. before the Honorable Aaron Jaffe in Courtroom #2405, Circuit Court of Cook County, Illinois to determine whether the proposed settlement, including payment of attorneys' fees, is fair, reasonable and adequate, and whether a final judgment should be entered approving it and dismissing the lawsuit against Synchronys. You may appear personally or by counsel; if you do not appear you will be represented by Class Counsel. To object, you must file a written objection, received by the Court by June 15, 1996.

IF YOU BELIEVE YOU ARE A MEMBER OF THE SETTLEMENT CLASS AND HAVE NOT RECEIVED THE MAILED NOTICE, YOU SHOULD REQUEST A COPY BY TELEPHONE (1-800-335-4059). PLEASE DO NOT CONTACT THE COURT FOR INFORMATION. ALL QUESTIONS RELATING TO THE PROPOSED SETTLEMENT SHOULD BE DIRECTED IN WRITING TO THE PLAINTIFFS' CLASS COUNSEL, LARRY D. DRURY, ESQ., 180 NORTH LA SALLE ST., #2416, CHICAGO, IL 60601, OR BEN BARNOW, ESQ., 105 W. MADISON, 22ND FLOOR, CHICAGO, IL 60602.

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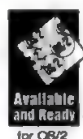
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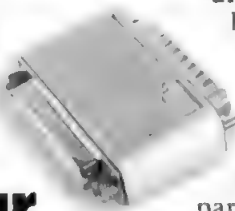
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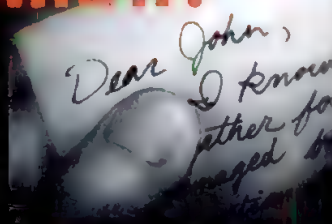
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At Home

A SPECIAL REPORT ON PRODUCTS FOR THE PERSONAL SIDE OF COMPUTING

Home PCs

Whether you're just starting out and need guidance, or know your way around computers, you'll find just what you need among this crop of 11 home PCs.

POWERHOUSE

By Bill Howard

What was unheard of three years ago is now commonplace: Free software bundles, color-coded cables, an easy OOB (out-of-box experience), and multimedia configurations are all now standard issue for a home PC. So the odds are that any of today's home PCs will be fairly capable.

The current era in home PCs dates to mid-1993 and the introduction of Compaq's Presarios. They were the first exclusively home PCs from a major business-oriented vendor. Packard Bell also deserves credit for shaping this market and luring in vendors such as Compaq.

The home market has been growing substantially—20 to 30

percent in each year since 1991—but growth will be about half of that this year, according to market researcher CI/Info Corp. As a result, the number of high-profile vendors is shrinking. Digital Equipment Corp. jettisoned its home-oriented Starion line in January, and Dell deliberately makes its PCs unattractive to first-time buyers by not bundling lots of software titles or customized front ends and tutorials.

REVIEW CRITERIA

For this At Home review of home PCs, we sought the most prominent home PC vendors; this roundup of 11 machines was by invitation only. We sought home-oriented Pentium PCs with 1GB-plus hard disks, 16MB of RAM, quad-speed or better CD-ROM drives, multimedia sound, 15-inch or larger monitors, consumer-oriented setup features, Windows 95, and home software bundles. Processor speed was left up to the vendors.

The 11 vendors who participated were Acer America Corp., AST Computer, Compaq Computer Corp., Dell Computer Corp., Gateway 2000, Hewlett-Packard Co.,

IBM PC Co., Micron Electronics, NEC Technologies, Packard Bell Electronics, and USA Flex.

TWO CATEGORIES

We believe that there are two kinds of home PC buyers today, in addition to self-employed SOHO users working out of the house. First, there are the *traditional home PC buyers*: mom, pop, and the kids—playing games, studying, paying bills. They're first-time buyers or less technical repeat buyers who want EZ-setup PCs and lots of "free" software. We believe the market is starting to run out of rank-amateur, first-time buyers.

Second are the *power home users*—people who value performance and already have the software they want.

Of the 11 systems that we

reviewed, units from Acer, Compaq, HP, and IBM are directed squarely at users in the first group. The units from AST and Packard Bell are in this category, too, although their features are less well-rounded. All were easy to set up and came with excellent software bundles, including Windows front ends; however, their test scores fell in the lower part of the range. NEC's entry lacks a customized front end but has many of the helpful touches that the others do.

Dell bundles only Microsoft Office and so belongs strictly in the second group. The Dell unit also lacks extensive setup help, but it is fast.

In between are systems from Gateway, Micron, and USA Flex. All have some combination of power, software, and easy setup, typically

two out of three such features per vendor. Power users would be happy with any one of them; so might novice users. Gateway's P5-166, for instance, has great speed and the best software bundle of the bunch, but its OOBE rating is only average.

PERFECT HOME PC

You don't want your new PC to feel slow 18 months from now. So while the \$1,499 prices on stripped Pentium/75 systems are appealing, we believe the sweet spot of the market is one processor group down from the top. The top dogs now are the Pentium/150 and Pentium/166 twins; these pricey CPUs currently sell for \$428 and \$632 per part, respectively, in 1,000-unit quantities.

One step below that is the Pentium/133 CPU, which sells for \$321. Since Pentium/133s use a 66-MHz system bus, a well-tuned unit can surpass the performance of a Pentium/150 PC, which uses a 60-MHz bus. Minimalist Pentium/133 units can be had for \$1,999; better equipped systems run \$2,500 to \$3,500.

Our perfect home PC has 16MB—not 8MB—of RAM (more memory improves performance), a 256K secondary (L2) cache, a fast 1.2GB or larger hard disk, a 4X or faster CD-ROM drive, a 64-bit graphics accelerator, a 28.8-Kbps data/fax modem, and a 17-inch monitor so that you can operate comfortably at either 800-by-600 or 1,024-by-768 resolution. If you opt for 800-by-600, you should be fine with a 15-inch display—and you'll save \$300.

PROBLEM AREAS

In testing, we found that our fastest PC (Gateway's P5-166) was nearly twice as fast as our slowest unit (Packard Bell's Designer Tower), as measured

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REPORT CARDS

Reading the Report Card

We graded each of the systems in six categories important to home users. The grades we used and their meanings are: **A+**, excellent; **A**, significantly above average; **B**, above average; **C**, average; **D**, below average; **E**, fail.

Setup focuses on how much setup assistance is provided for users. Setup posters, tutorials, color-coded cables, labeled ports, and a Windows front end all give extra points. **Performance** ratings represent overall system performance as measured by our ZD Win-

stone 96 and ZD CD-ROM WinMark 96 tests. A system's **sound** mark represents how well it fared on our subjective sound tests, in which we assess the quality of the sound card and included speakers when playing analog sound, .WAV files, and audio CDs.

Edutainment indicates how well a unit suits educational and entertainment needs. We consider multimedia performance, software, and accessories. For the **productivity** category, we look at how well a system meets productivity needs. Key factors include bundled office suites, communications hardware and software, and performance.

REPORT CARD

Product Name

Setup	A+
Performance	A
Sound	B
Edutainment	C
Productivity	D

by our Winstone 96 rating of overall system performance.

There are four factors that account for the performance spread among the 11 PCs.

- **CPU speed.** CPUs ranged from 133 MHz to 166 MHz.

- **Detuned systems.** You can trade performance for stability. In home PCs, that's not a bad thing.

- **Lower-cost components.** AST, HP, and Packard Bell PCs came with slower 4,480-rpm hard disks; the others had 5,200- or 5,400-rpm drives. We estimate that this dropped overall system performance by more than 10 percent, or 5-plus points on the Winstone score. Packard Bell used a 32-bit graphics accelerator; the others had 64-bit adapters.

- **Cheaper cache.** Of the 11 systems, 6 used cheaper asynchronous L2 cache instead of faster pipelined-burst cache. Many home PCs don't have L2 cache at all; this can lower performance by 10 to 20 percent.

There was one performance ace in the bunch: Gateway's P5-166. One of our Editors' Choices in this roundup, it came with a Pentium/166 CPU, 512K of L2 pipelined-burst cache, and a high-end Matrox MGA Millennium graphics card.

SOFTWARE BUNDLES

Traditional home PC buyers are interested in both the quality and quantity of bundled software. Typically, you'll get an integrated package such as Microsoft Works (word processor, spreadsheet, database), a personal finance program, games, plus communications and a telephony package (answering machine, speakerphone).

BELLS AND WHISTLES

Some features of PCs are a matter of personal preference. For instance, the units from

Acer Aspire Gateway P5-166

Home PCs, including the 11 we tested here, fall into two categories: PCs for first-time, nontechnical buyers and PCs for experienced users that focus on sheer performance. Our first Editors' Choice, the \$3,098 Pentium/133-based Acer Aspire,

offers the best array of features for novice users. With color-coded cables, a setup poster, and the Acer Computer Explorer (A.C.E.) Windows front end to guide you through Windows 95 and the other included software, Acer helps take the anxiety out of buying a new PC. The Aspire has a 17-inch monitor with integrated speakers, a 28.8/14.4-Kbps voice modem, a 6X CD-ROM drive, and a 2.1GB hard disk.

Editors' Choice honors also go to the \$3,837 Pentium/166-based Gateway P5-166: a no-holds-barred system that offers savvy power users not only class-leading performance but also top-notch sound featuring Altec Lansing ACS-400 speakers with a subwoofer. Performance was helped by the 512K of pipelined-burst L2 cache, 1.5GB hard disk, and Matrox MGA Millennium

graphics card with 2MB of WRAM. The P5-166 also comes with a 28.8/14.4-Kbps data/fax modem, a 17-inch monitor, and useful productivity titles.

Honorable mention goes to the \$2,895 USA Flex Multimedia Classic. The Pentium/133-based system boasts top-notch performance in its class, rivaling that of the tested Pentium/150 PCs, and many amenities for first-time buyers at a bargain-price. Its OOBE

rating was not as high as others', however.

We also liked two other PCs. The Pentium/166-based Dell Dimension XPS P166c offers experienced users great performance and Microsoft Office for \$2,999. Both types of users would be very happy with NEC's Pentium/150-based Ready 9552: It has good performance, easy setup, and a 28.8-Kbps DSVD modem plus an infrared transceiver.



Acer and HP are beautifully sculpted, but that doesn't help their performance. Several vendors sell monitors with integrated speakers; you trade off some sound quality for convenience and fewer plugs and cables. Some also have 3-D sound that gives a bit more depth to the audio.

Certain accessories are also interesting: Compaq offers a Visioneer monochrome scanner integrated into the keyboard of some Presario models, HP will offer a color photo scanner (snapshot-size) standard in Pavilion 7130P models, and Compaq also offers the Panasonic PD/CD drive with some PCs. This drive acts as a normal 4X CD-ROM drive but is also capable of reading and writing to proprietary, rewritable 650MB phase-

change cartridges.

All of the machines we tested came with modems. AST, IBM, and NEC have DSVD shared voice and data modems.

WHAT'S AHEAD

As the year progresses, look for vendors to offer more specialty systems. NEC earlier this year sold 5,000 game-oriented PCs, the Ready Power-Player LE series. Gateway recently announced Destination, a PC with a wireless keyboard and a 31-inch monitor that doubles as a TV set. A Pentium/120 Destination with

16MB of RAM, 1.2GB hard disk, multimedia titles, and a 6X CD-ROM drive will cost about \$4,000. Several vendors are also talking about offering Internet PCs with ISDN adapters.

By the time of the fall refresh of PCs, you'll see 200-MHz Pentium CPUs available. At that point, the best-buy sweet spot will be systems with 166-MHz CPUs. And at year's end you may see the P55C, a high-speed Pentium optimized for multimedia applications. Also look for EIDE hard disks available in 2.5GB capacities;

Our Contributors: BILL HOWARD is an executive editor of *PC Magazine*. ROBERT S. ANTHONY is a senior writer at *PC Magazine*. MARY E. BEHR and DAVID LIDSKY are staff editors of *PC Magazine*. ANUSH YEGYAZARIAN, a staff editor of *PC Magazine*, was the editor in charge of this story, and RICHARD FISCO was the project leader.

Price/Performance Index: Home PCs

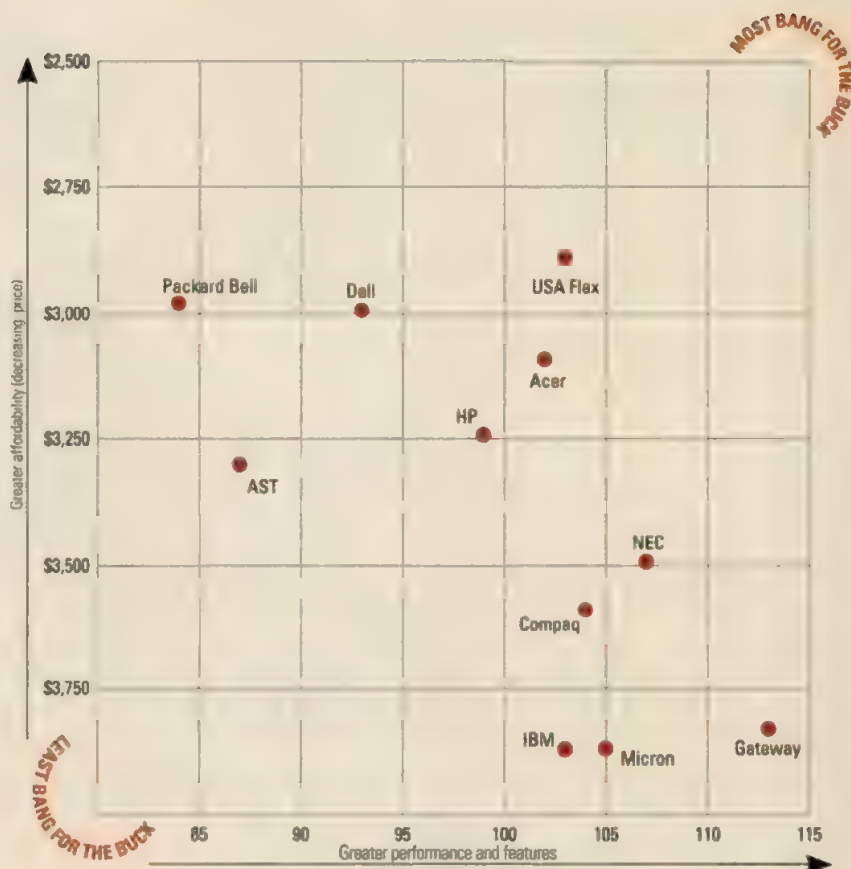
Our Editors' Choice in the power-home-user category, the \$3,837 Gateway P5-166, earned the best performance/features ratio in this roundup. This PC, a top performer, garnered the highest Winstone 96 score in this roundup. It also features an extensive software bundle and an exceptional sound system.

The \$3,098 Acer Aspire, our Editors' Choice recipient in the novice-user category, also placed well on our chart. This machine received a grade of A+ for setup, a score matched by no other PC in this roundup.

The USA Flex Multimedia Classic, which received an honorable mention in this roundup, distinguished itself thanks to its top-notch components, leading performance within its CPU group, and excellent software bundle—all for \$2,895.

THE DATA POINTS

Because this is a home-oriented roundup, we've reapportioned the performance/features weights. Benchmark test results account for 18 percent of the score; previously, they had accounted for 45 percent. Warranty information, service and reliability ratings, and OOB features account for 29 percent. Software compatibility



ratings and sound ratings account for 13 percent. Various hardware features account for the rest of the score.

You can find price/performance

index data in the Hardware Library of the Editorial Forum on PC MagNet under 08BANG.txt and on the World Wide Web at <http://www.pcmag.com>.

3-D rendering to give animation and games a more lifelike feel; and machines equipped with a Universal Serial Bus (USB) to give you the ability to connect multiple devices without running out of connectors or interrupts.

Acer America Corp.

Acer Aspire



Acer America's \$3,098 Aspire, our Editors' Choice for first-time buyers, is leading a home PC revolution. From its curvy, nonconformist design to its competitive perfor-

mance and effortless setup, the 133-MHz Pentium-based mini-tower is a standout in a world of beige boxes. Acer also offers the AcerPower line of corporate PCs.

Color-coded cables and a setup guide make setup easy. Bundled with the unit is Acer Computer Explorer (A.C.E.), an engaging Windows 95 front end that gives users quick access to on-line help.

The Aspire's emerald green

case design (also available in charcoal) is anything but typical: Even the monitor's ventilation holes are stylish. The sculpted keyboard has a removable purple wrist rest; the 17-inch monitor has front-

mounted Aura Systems' Aurasound 3D speakers, as well as a microphone and headphone jacks.

The monitor speakers and 28.8/14.4-Kbps voice modem combine to create a full-



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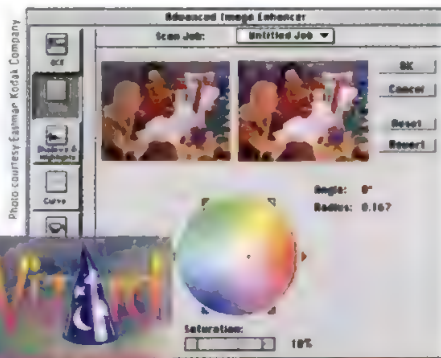
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duplex speakerphone with voice mail. Verbex Voice System's Listen for Windows 2.0 lets users give simple verbal commands to the Aspire (such as Open or Close File).

The rest of the software bundle was adequate. Notable titles include Intuit's Quicken SE CD-ROM, Microsoft Works, and Creative Multimedia's Family Doctor. The unit encountered no problems on our software compatibility tests.

The Aspire came with a 2.1GB hard disk, a 6X CD-ROM drive, and a graphics subsystem based on an ATI Mach64 chip set with 2MB of DRAM.

On our benchmark tests, the Aspire posted an above-average Disk WinMark 96 score compared with those of the other Pentium/133 PCs; its Winstone 96, CD-ROM, and Graphics WinMark 96 scores were average. Its CPUmark scores were low, however, because the machine used the slower, asynchronous cache instead of the faster, pipelined burst cache.

The warranty covers three years on parts and labor and includes a year of on-site service.—*Robert S. Anthony*
Acer Aspire. Estimated street price: \$3,098. Acer America Corp., San Jose, CA; 800-733-2237, 408-432-6200; fax, 408-922-2933; <http://www.acer.com/aac>. *Circle 401 on reader service card.*

AST Computer Advantage! 818

A well-rounded software bundle and remote diagnostic features make AST Computer's \$3,305 Advantage! 818 a user-friendly home system. AST aims the unit at more experienced multimedia home users, but some of these buyers may be disappointed by the unit's below-average performance. AST also makes the Premmia line of high-end corporate and CAD workstations and Bravo line of business PCs.

The 818's setup was fairly simple. And once the PC is on, you can access online help through the AST Spot, a blue dot that sits innocuously on the Windows 95 desktop.

The unit's 15-inch monitor had a microphone and two speakers built into the case, but a set of powered speakers was also sent; these were tested with the unit and are included in the quoted price. The powered speakers sounded better than the integrated ones but still had an audible hiss.

Syncro Multimedia Connect software and the 28.8/14.4-Kbps DSVD voice modem allow fax, multiple voice-mail boxes, and a full-duplex speakerphone. Other bundled software includes Quicken

SE and Grolier's Multimedia Encyclopedia. The unit did well on our software compatibility tests.

The 818's test scores came in at below average for its group across all our tests. Its 1.6GB Maxtor hard disk

had a slower rotational speed than most others in this roundup, and its use of asynchronous cache lowered its CPU scores and affected all other subsystems.

The unit comes with AST LifeLine remote diagnostic software. AST also provides 30 days of free technical support for third-party software and a one-year warranty with on-site service.—*RSA*

Advantage! 818. Street price: \$3,305. AST Computer, Irvine, CA; 800-876-4278, 714-727-4141; fax, 714-727-8597. <http://www.ast.com>. *Circle 402 on reader service card.*

Compaq Computer Corp.

Presario 9660

Compaq Computer Corp.'s \$3,593 Presario 9660 has enough features to keep any home PC user satisfied. Compaq also boasts top-notch service and reliability ratings. But it lacked performance for its class: The other reviewed Pentium/166 PCs performed significantly better on our tests.

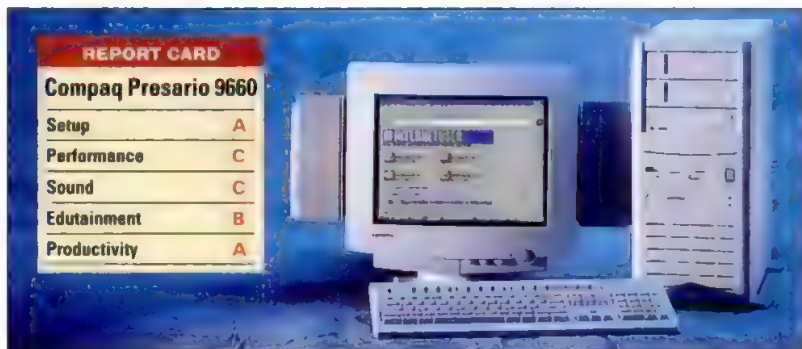
The Presario 9660 is the flagship in Compaq's Presario line of multimedia home PCs, which includes the value-oriented 7200 series and the midrange 9200 line. Compaq also markets business systems: The ProLinea value line, the DeskPro network line, and the high-end DeskPro XL series.

Setting up the 9660 is a snap with the help of a poster guide and a set of quick-reference booklets. The unit includes the easy-to-use Presario Gallery as a front-end shell and offers extensive online help. Software includes Compton's Interactive Encyclopedia 96, PerfectWorks 2.1, Quicken for Windows 4.0, and Interplay's Descent.

The Presario's main board is rich in integrated features such as S3's Trio 64V+ graphics chip set with 2MB of EDO DRAM, Compaq's 16-bit wavetable audio chip, and an MPEG decoder chip. Other features include a 28.8/14.4-Kbps voice modem and a 2.1GB hard disk.

The unit's 15-inch monitor has two speaker "ears" and a front-panel volume control; its keyboard has the two special Windows 95 keys used in Microsoft keyboards.

Because it used asynchronous cache, the Presario's test scores couldn't match those of the other tested Pentium/166 PCs. However, its scores were mostly average for all the reviewed PCs. Its CD-ROM



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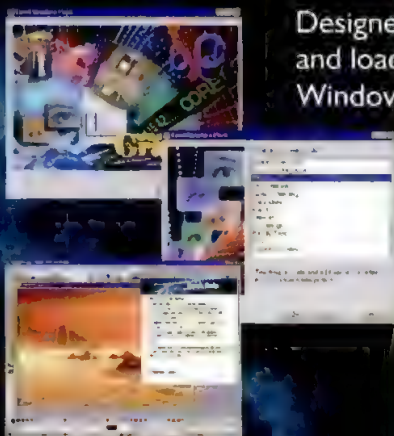
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What the Numbers Mean

ZD WINSTONE 96

With an impressive array of top-performing components, the Editors' Choice Gateway P5-166 earned the highest Winstone 96 score ever recorded in a comparative review: 77. A Pentium/166 CPU, 512K of pipelined-burst L2 cache, EDO DRAM, a 5,200-rpm Enhanced IDE (EIDE) hard disk, and a Matrox MGA Millennium graphics card contributed to this PC's great performance. The top-performing Pentium/133 system, the USA Flex Multimedia Classic, earned a respectable score of 63. With 256K of pipelined-burst L2 cache, the same hard disk as Gateway's entry, and a Hercules Graphics Terminator Pro PCI 2M graphics card, the USA Flex Multimedia Classic even outperformed tested Pentium/150 PCs.

ZD GRAPHICS WINMARK 96

The Gateway P5-166's Matrox graphics accelerator card helped it garner a score of 30.3 on our Graphics WinMark tests. The Millennium uses Window RAM, which has a dual-ported design that enables it to transmit graphics-drawing-data input and screen-refresh output simultaneously.

The Packard Bell Designer Tower's graphics subsystem, based on an integrated 32-bit Cirrus Logic CLGD 5440 chip set (all other systems in this roundup used 64-bit chip sets), produced this roundup's lowest Graphics WinMark score.

ZD DISK WINMARK 96

Units with Quantum Fireball Fast ATA-2 hard disks showed the best disk performance. Thanks to the disk's 5,400-rpm rotational speed and high transfer rate, these systems edged out units using Western Digital Caviar AC31600 disks, except in one case. The NEC Ready 9552, with a Pentium/150 and a Caviar AC31600, beat out the IBM Aptiva A50, with a Pentium/150 and a Fireball 1080A disk. It was the Aptiva A50's slower CPU/memory subsystem that made the difference, negatively affecting its performance on our other tests.

ZD CPUMARK₁₆ AND ZD CPUMARK₃₂

Just over half the systems in this roundup used asynchronous L2 cache, which cannot handle the faster burst timings that synchronous cache can. Systems using pipelined-burst synchronous cache were able to outperform those with asynchronous cache by a significant margin on our CPUMark₁₆ tests.

The Gateway P5-166's use of 512K of pipelined-burst cache, twice what is usually found in mainstream or home PCs, gave this unit the top CPUMark₁₆ score. Three systems—Acer's, Compaq's, and IBM's—used non-Intel chip sets. Although it may look as if these chip sets performed poorly, again, it was the type of cache that counted most. All three PCs came with asynchronous cache.

CD-ROM AND MULTIMEDIA TESTS

The AST Advantage! 818 was the only PC to drop a significant number of frames when we tested high-quality video playback. It had an ATI Mach64 graphics chip set with an older version of the graphics driver than the one in the Acer, which had the same graphics chip set but dropped no frames.

To stress the video subsystems, we also ran a clip at 300 KBps that we expanded to full screen. Color-space conversion and *x* and *y* interpolation built into the graphics chip set are the keys to good performance on the full-screen tests. Chip sets such as the S3 Trio 64V+, used in Compaq's unit, and the Trident 9680XGi, used in IBM's PC, have the features necessary, but the Compaq PC used an older driver, and we suspect the IBM PC's driver was less optimized. Both, therefore, dropped frames. Units using chip sets without *x* and *y* interpolation, such as the ATI Mach64 and the Cirrus Logic CLGD 5440, dropped the most frames.

The CD-ROM drives all performed as expected except for the Wearnes CDD-620 in the Gateway P5-166. It is a 6X drive, but its showing on our Sequential 16K Read test reminded us of 4X drive performance. The drives's average access time of 240 ms is extremely slow for a 6X drive and resulted in the system's poor CD-ROM WinMark score.

—Analysis written by Richard Fisco

▲ Higher scores represent better performance. ▼ Lower scores represent better performance. Red type denotes first place.	ZD CPUMark ₃₂ ▲	ZD CD-ROM WinMark 96 ▲	CD-ROM			HIGH-QUALITY ACTION INDEO ¹		FULL- SCREEN SCALING ²		MEDIUM- QUALITY ACTION CINEPAK ³	
			Sequential 16K Read (KBps) ▲	Access Time (ms) ▼	CPU Utilization ▼	Frames Dropped ▼	CPU Utilization ▼	Frames Dropped ▼	CPU Utilization ▼	Frames Dropped ▼	CPU Utilization ▼
Acer Aspire (P/133)	179	436	916	248	37%	0	75%	448	97%	0	50%
AST Advantage! 818 (P/133)	204	368	610	313	55%	32	96%	355	99%	0	77%
Compaq Presario 9660 (P/166)	226	548	919	169	48%	0	90%	346	100%	0	66%
Dell Dimension XPS P166c (P/166)	301	605	919	168	30%	0	53%	0	64%	0	40%
Gateway P5-166 (P/166)	326	480	609	238	38%	0	72%	0	75%	0	57%
HP Pavilion 7090 (P/133)	212	376	613	248	30%	1	74%	0	73%	0	52%
IBM Aptiva A50 (P/150)	216	581	919	169	40%	0	71%	158	100%	0	54%
Micron P166 Home Pro MPC (P/166)	309	577	920	160	52%	0	62%	0	68%	0	48%
NEC Ready 9552 (P/150)	257	417	613	230	46%	0	86%	0	97%	0	66%
Packard Bell Designer Tower (P/133)	202	447	615	221	25%	0	91%	440	98%	0	64%
USA Flex Multimedia Classic (P/133)	270	507	901	203	60%	0	66%	0	71%	0	48%

1 With an Action, Indeo, 320 x 240, 30-fps, 600-KBps clip.

2 With an Action, Indeo, 160 x 120, 30-fps, 300-KBps clip scaled to full screen (1,024 x 768).

3 With an Action, Cinepak, 320 x 240, 30-fps, 300-KBps clip.

How We Tested

We tested all PCs with 1GB hard disks or larger, 4X CD-ROM drives or faster, 16-bit sound boards, and 16MB of RAM. We used each vendor's preinstalled graphics driver for 1,024-by-768 resolution with 256 colors, small fonts, and a refresh rate of 75 Hz (or as close as possible). We also disabled power-management features and let Windows 95 manage virtual memory settings.

We use our benchmark test suite **ZD Winstone 96, Version 1.0**, to measure performance when running Windows applications. Winstone 96 measures the time a PC takes to execute a set of scripts that exercise 13 best-selling Windows applications. Winstone weights a given PC's test timings based on the applications' unit market shares; it derives a composite number and converts it to a relative score. (The score is relative to the performance of a 486SX/25 Dell 425s/P with 8MB of RAM, whose score is defined as 10.)

We use our benchmark test suite **ZD WinBench 96, Version 1.0**, as a measure of graphics, disk, processor, CD-ROM, and motion-video performance under Windows. The **ZD Graphics WinMark 96** score, a number based on 115 tests of Windows GDI functions, represents the performance of each machine's graphics subsystem under Windows. The **ZD Disk WinMark 96** score, a harmonic mean based on application profiling, represents the disk subsystem's performance under Windows. The **ZD CPUmark₁₆** and **ZD CPUmark₃₂** scores indicate the speed of a PC's processor subsystem under 16-bit and 32-bit Windows operating systems, respectively. WinBench 96 bases these scores on large instruction mixes that emulate the processor activity of real-world applications.

The **ZD CD-ROM WinMark 96** score gauges the performance of each PC's CD-ROM subsystem, which includes the CD-ROM drive, its adapter, and the software drivers it requires to operate. This test is based on a profile of six of

today's most popular Windows CD-ROM applications.

We report the results of the CD-ROM **Sequential 16K Read** test, which measures the throughput of the CD-ROM subsystem when reading 16K blocks of data on a CD-ROM. The CD-ROM **Access Time** test measures the CD-ROM drive's performance while randomly accessing 2K files from the CD-ROM. We also use the CD-ROM **CPU Utilization** test to report the percentage of the processor's bandwidth occupied by servicing the CD-ROM subsystem while retrieving data. To determine utilization, WinBench 96 uses a default block size of 16K. The transfer rate defaults to the maximum transfer rate of the CD-ROM subsystem. WinBench 96 calculates the transfer rate before it runs the test. WinBench 96 also includes Video Test, a test suite comprising 33 video clips, to measure a PC's ability to play full-motion .AVI video files. The Video Test measures a system's video-playback performance using either the Indeo or the Cinepak codec. We report results from the **High-Quality Action Indeo** tests, which use the Action, Indeo, 320-by-240, 30 frame-per-second, 600-KBps video clip; the **Full-Screen Scaling** tests, which use the Action, Indeo, 160-by-120, 30-fps, 300-KBps video clip; and the **Medium-Quality Action Cinepak** tests, which use the Action, Cinepak 320-by-240, 30-fps, 300-KBps video clip. We report both the number of **Frames Dropped** while playing each clip and the **CPU Utilization**, which is the percentage of processor resources used to run each clip.

Our software compatibility tests called for a unit to be able to load and run the following applications successfully: Compton's Interactive Encyclopedia 1996, LucasArts' Dark Forces, Disney's The Lion King Activity Center, Microsoft 3D Movie Maker, and Origin's Wing Commander III: Heart of the Tiger. Go to <http://www.pcmag.com> for a chart of results and more analysis.

ZD WINSTONE 96

Score ► 0 10 20 30 40 50 60 70 80

Acer Aspire (P/133)	48
AST Advantage! 818 (P/133)	47
Compaq Presario 9660 (P/166)	56
Dell Dimension XPS P166c (P/166)	71
Gateway P5-166 (P/166)	77
HP Pavilion 7090 (P/133)	51
IBM Aptiva A50 (P/150)	52
Micron P166 Home Pro (P/166)	71
NEC Ready 9552 (P/150)	62
PB Designer Tower (P/133)	40
USA Flex Classic (P/133)	63

WORST

BEST

ZD DISK WINMARK 96

Score ► 0 200 400 600 800 1,000 1,200

Acer Aspire (P/133)	922
AST Advantage! 818 (P/133)	694
Compaq Presario 9660 (P/166)	949
Dell Dimension XPS P166c (P/166)	1,140
Gateway P5-166 (P/166)	1,030
HP Pavilion 7090 (P/133)	712
IBM Aptiva A50 (P/150)	960
Micron P166 Home Pro (P/166)	1,160
NEC Ready 9552 (P/150)	1,010
PB Designer Tower (P/133)	705
USA Flex Classic (P/133)	1,020

WORST

BEST

ZD GRAPHICS WINMARK 96

Millions of pixels per second ► 0 5 10 15 20 25 30 35

Acer Aspire (P/133)	16.0
AST Advantage! 818 (P/133)	12.5
Compaq Presario 9660 (P/166)	15.1
Dell Dimension XPS P166c (P/166)	23.6
Gateway P5-166 (P/166)	30.3
HP Pavilion 7090 (P/133)	13.6
IBM Aptiva A50 (P/150)	13.7
Micron P166 Home Pro (P/166)	27.6
NEC Ready 9552 (P/150)	19.8
PB Designer Tower (P/133)	8.7
USA Flex Classic (P/133)	21.2

WORST

BEST

ZD CPU MARK₁₆

Score ► 0 50 100 150 200 250 300 350

Acer Aspire (P/133)	195
AST Advantage! 818 (P/133)	211
Compaq Presario 9660 (P/166)	241
Dell Dimension XPS P166c (P/166)	307
Gateway P5-166 (P/166)	326
HP Pavilion 7090 (P/133)	220
IBM Aptiva A50 (P/150)	223
Micron P166 Home Pro (P/166)	312
NEC Ready 9552 (P/150)	270
PB Designer Tower (P/133)	213
USA Flex Classic (P/133)	269

WORST

BEST

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Perfecting the PC

WinMark 96 score was above average because of its fast 6X CD-ROM drive.

Compaq provides a three-year parts, one-year labor warranty with 90 days of free on-site service.—*RSA*

Presario 9660. Estimated street price: \$3,593. Compaq Computer Corp., Houston, TX; 800-345-1518; fax, 713-518-1442; <http://www.compaq.com>. *Circle 403 on reader service card.*

Dell Computer Corp.

Dell Dimension XPS P166c

The \$2,999 Dell Dimension XPS P166c's combination of lowest price for tested Pentium/166 PCs and above-average performance makes it very attractive to experienced home users. The included Microsoft Office 95 package should satisfy the unit's target audience of SOHO buyers, but no other application software is included. Dell offers the Dimension line for small- to medium-sized businesses and targets the OptiPlex line for corporations.

Dell makes it clear that the Dimension XPS is not for PC novices. The unit comes with a setup guide and information about the company's support offerings, but few other amenities for beginners are offered.

The Dimension is powered by 256K of pipelined-burst L2 cache, a 1GB Quantum Fireball hard disk, and a Number Nine 9FX Motion 771 graphics card. These high-end elements showed their worth on our tests, with all scores above average for the tested group.

Sound is handled by a 16-bit sound card and Altec Lansing ACS5 speakers. A 15-inch monitor, 6X TEAC CD-ROM drive, and 28.8/14.4-Kbps fax modem came with the unit.

Those planning to add soft-

ware can rest assured: The unit had no problems on our software compatibility tests. Its great hardware makes it a capable blank canvas for education functions despite its lack of software. The Dimension has a three-year parts, one-year labor and on-site service warranty.—*Mary E. Behr*
Dell Dimension XPS P166c. Direct price: \$2,999. Dell Computer Corp., Austin, TX; 800-613-3355, 512-338-4400; fax, 512-728-3653; <http://www.dell.com>. *Circle 404 on reader service card*

Gateway 2000 Inc.

Gateway P5-166

Whether you're a games aficionado or a home-office worker, you won't be disappointed with the \$3,837 Gateway P5-166, our Editors' Choice for experienced users. The Pentium/166

tower unit is aimed at power home users and features top performance, great software (including Microsoft Office Professional 95), a 17-inch monitor, and a top-shelf audio system. Gateway markets its Family Line of home PCs to cost-conscious first-time buyers.

Gateway sup-

plies documentation and a quick-start guide; in addition, small icons mark each rear port.

Gateway offers its Pentium PCs with a variety of software bundles. The tested unit came with the vendor's Generations II Software Collection (family and home-oriented); Finance Software Pack, and Kid's Backpack II, which even includes a cow-spotted vinyl backpack. (These latter bundles are options, priced at \$79 and \$59 respectively, and are included in the price above.) The unit encountered no problems on our software compatibility tests.

"Awesome" sums up our opinion of the unit's Altec Lansing ACS400 speakers, ACS250 subwoofer, and 16-bit Ensoniq wavetable sound card. The combination received the highest mark of any system reviewed on our subjective sound tests. A Matrox MGA Millennium graphics

card with 2MB of WRAM, a 1.5GB hard disk, and a 6X CD-ROM drive round out the unit's hardware.

The P5-166 earned the best Winstone 96 and Graphics WinMark 96 scores in

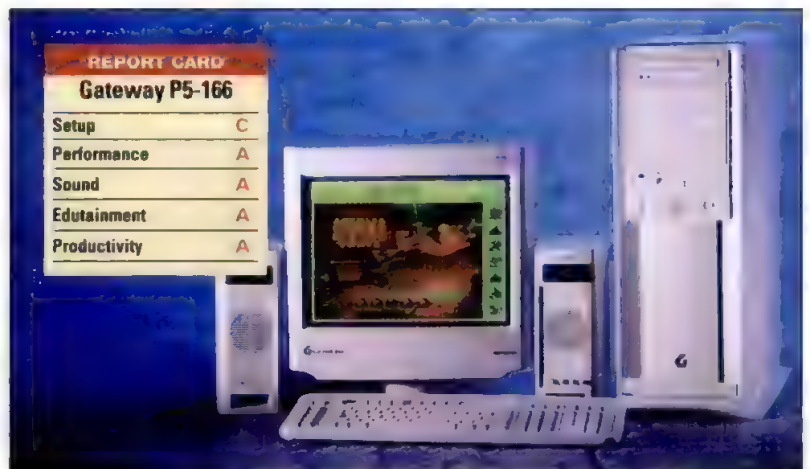
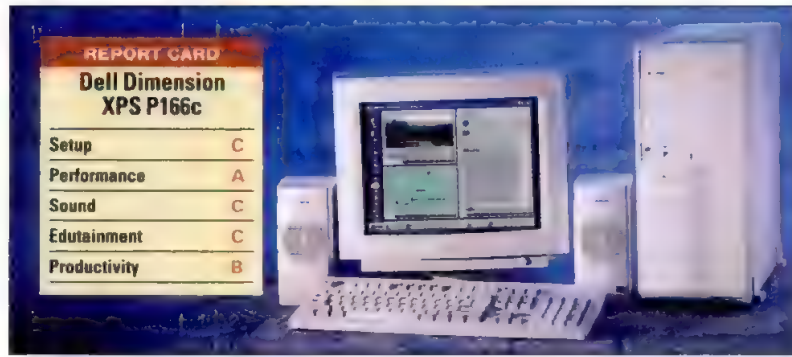
this roundup and achieved excellent results on most other tests.—*RSA*

Gateway P5-166. Direct price: \$3,837. Gateway 2000, N. Sioux City, SD; 800-846-2000, 605-232-2000; fax 605-232-2023; <http://www.gw2k.com>. *Circle 405 on reader service card.*

Hewlett-Packard Co.

HP Pavilion 7090

Hewlett-Packard has designed the Pentium/133-based Pavilion 7090 to be a PC for the entire family. Its mix of an easy setup, a helpful custom front end, and some good software—all at an affordable \$3,248 street price—make it appealing. The unit's performance was competitive for its class. HP also markets the Vectra lines of business PCs: the entry-level VE series, the value-oriented VE4s, the network-ready XMs, and the high-end XU line.



HP includes color-coded cables and a poster to facilitate both setup and navigation around Personal Page, its front end. Personal Page gives you an animated tour of your PC's software and offers tutorials.

This minitower also has a 1.6GB hard disk, 256K of asynchronous L2 cache, a 4X CD-ROM drive, 16-bit sound card with FM and wavetable synthesis, and a 28.8/14.4-Kbps data/fax modem. The 15-inch HP monitor boasts detachable Altec Lansing speakers, a microphone, headphone jack, volume control, and a mute button.

Graphics performance, powered by an S3 Trio 64V+ chip set with MPEG playback capabilities and 1MB of DRAM, was below average for the tested group. Winstone 96 and Disk Winmark 96 scores were also below average; the rotational speed of the unit's Maxtor hard disk—slower than that of most others in this roundup—no doubt affected its performance.

Bundled software includes Microsoft Encarta 95 and Quicken SE. The unit had no problems on our software compatibility tests. It has a one-year warranty with on-site service.—MEB

HP Pavilion 7090. Street price: \$3,248. Hewlett-Packard Co., Palo Alto, CA; 800-724-6631, 810-357-1219; fax, 810-357-1317; <http://www.hp.com>. Circle 406 on reader service card.



Service and Reliability

Service and Reliability ratings are derived from *PC Magazine's* 1995 reader survey on vendor service and reliability for PCs in use over the past two years (see our issue of July 1995 for details).

The *reliability* rating is a measure of respondents' satisfaction with the reliability of a vendor's machines.

The *repair* and *tech support* ratings are measures of respondents' satisfaction with the vendor's repair service and technical support, respectively. The *percent needing repair* rating is a measure of the percentage of computers that respondents indicated needed repair during the first year of use.

	Better than average = ▲	Average = ●	Worse than average = ▼	
Vendor	Reliability	Repair	Tech support	% needing repair
Acer	●	●	●	▲
AST	▲	▲	●	▲
Compaq	▲	▲	▲	▲
Dell	▲	▲	▲	●
Gateway	▲	▲	▲	●
Hewlett-Packard	▲	▲	▲	▲
IBM	▲	▲	▲	▲
Micron	▲	▲	▲	●
NEC	●	●	●	▲
Packard Bell	●	▼	▼	▲
USA Flex	●	●	●	▼

IBM PC Co.

IBM Aptiva A50

The \$3,878 Pentium/150-based IBM Aptiva A50 has a lot to make it attractive to first-time home PC buyers, such as easy setup, a helpful customized front end, good productivity software, games, and top-notch service and reliability ratings. However, some may be disappointed by the unit's lackluster performance. IBM also offers the mid-range PC 300 and high-end PC 700 lines of business PCs.

IBM provides a detailed setup poster and booklets that give you all the setup information you need. The Aptiva

Guide, a custom front end, offers a multimedia tour of your PC and provides tutorials.

The unit comes with a 17-inch monitor and an IBM MWave combination 16-bit sound card and 28.8/14.4-Kbps DSVD modem. With IBM Operator, the PC acts as a fax and answering machine for multiple users; it also has a full-duplex speakerphone. Voice Type

Control lets you navigate Windows using basic voice commands; Rapid Resume puts your PC in suspend mode and wakes it up to receive messages and faxes.

The integrated Trident 9680 XGi graphics chip set is

optimized for MPEG functions (IBM offers a combination software and hardware MPEG solution). The unit performed well on most video tests.

Because the unit had 256K of asynchronous L2 cache, its scores on our CPUMark tests were low. The Aptiva's slow CPU/memory subsystem affected its other test scores: Most were below average for the tested group, though its 1GB Quantum Fireball hard disk and fast TEAC 6X CD-ROM drive helped it achieve good Disk WinMark 96 and CD-ROM WinMark 96 scores. The unit now comes with a 1.6GB hard disk.

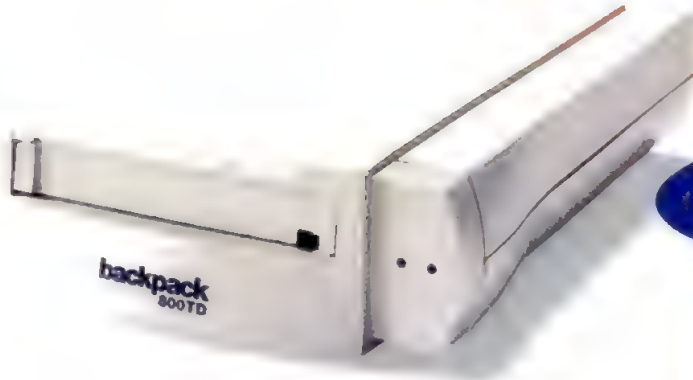
Software includes an IBM Internet browser, Compton's Interactive Encyclopedia 96, Lotus SmartSuite, Descant,





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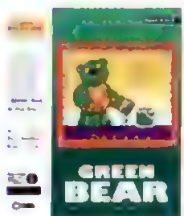
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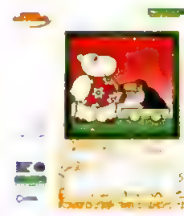
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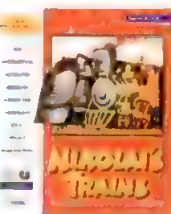
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SUMMARY OF FEATURES

Home PCs

	PC MAGAZINE EDITOR'S CHOICE		PC MAGAZINE EDITOR'S CHOICE				
	Acer Aspire	AST Advantage! 818	Compaq Presario 9660	Dell Dimension XPS P166c	Gateway P5-166	HP Pavilion 7090	IBM Aptiva A50
Price of tested configuration	\$3,098 (street)	\$3,305 (street)	\$3,593 (street)	\$2,999 (direct)	\$3,837 (direct)	\$3,248 (street)	\$3,878 (list)
Processor	Pentium/133	Pentium/133	Pentium/166	Pentium/166	Pentium/166	Pentium/133	Pentium/150
Installed/maximum RAM	16MB, 128MB	16MB, 128MB	16MB EDO, 128MB	16MB EDO, 128MB	16MB EDO, 128MB	16MB, 128MB	16MB EDO, 128MB
Hard disk capacity and interface	2.1GB Fast ATA-2	1.6GB EIDE	2.1GB Fast ATA-2	1GB Fast ATA-2	1.5GB EIDE	1.6GB EIDE	1GB Fast ATA-2
Graphics adapter	Integrated (ATI Mach64)	Integrated (ATI Mach64)	Integrated (S3 Trio 64V+)	Number Nine 9FX Motion 771	Matrox MGA Millennium	Integrated (S3 Trio 64V+)	Integrated (Trident 9680XGi)
Memory	2MB DRAM	1MB DRAM	2MB EDO RAM	2MB VRAM	2MB WRAM	1MB DRAM	2MB VRAM
Monitor manufacturer and model	AcerView 76is	AST Vision 5M	Presario 1510	Dell D1528-LS	Sony CPD-17F13	HP D3857A	IBM G70
Screen diagonal claimed/measured (inches)	17, 15.8	15, 13.5	15, 13.6	15, 13.8	17, 16	15, 13.6	17, 15.8
CD-ROM drive (speed and interface)	Mitsumi CRMC-FX600 (6X ATAPI)	Toscan CDR-S1G (4X ATAPI)	TEAC CD-56E (6X ATAPI)	TEAC CD-56E (6X ATAPI)	Wearnes CDD-620 (6X ATAPI)	Mitsumi CRMC-FX400 (4X ATAPI)	TEAC CD-56E (6X ATAPI)
Sound adapter	Creative Labs Vibra 16S	Crystal Lake CS4232	ESS Audio Drive	Creative Labs Vibra 16S	Ensoniq 9533	Crystal Lake CS4232	IBM MWave
Installed external RAM cache and type	256K asynchronous	256K asynchronous	256K asynchronous	256K pipelined-burst	512K pipelined-burst	256K asynchronous	256K asynchronous
Motherboard manufacturer	Acer	Intel	Compaq	Intel	Intel	Intel	IBM
Chip set manufacturer and model	ALI Aladdin	Intel Triton	OPTi ViperM	Intel Triton	Intel Triton	Intel Triton	OPTi Viper
BIOS manufacturer and version (or date)	Acer 2.0	AST 1.00.05.BU0Q	Compaq (12/1/95)	AMI A05	AMI 1.00.01CN0T	AMI 1.00.02.CAZL	IBM BG2US0E
Expansion-bus slots	3 ISA, 2 PCI, 1 PCI/ISA	5 ISA, 2 PCI	3 ISA, 1 PCI, 1 PCI/ISA	3 ISA, 3 PCI, 1 PCI/ISA	2 ISA, 3 PCI, 1 PCI/ISA	5 ISA, 2 PCI	5 ISA, 1 PCI, 1 PCI/ISA
Accessible drive bays (5.25", 3.5")	2, 1	3, 1	3, 1	3, 1	4, 1	3, 1	2, 2
Internal drive bays (5.25", 3.5")	1, 1	0, 3	0, 1	0, 2	0, 7	0, 3	0, 2
Power-supply wattage	145W	200W	145W	230W	145W	160W	145W
Parallel, serial, mouse ports	1, 2, 1	1, 2, 1	1, 1, 1	1, 2, 1	1, 2, 1	1, 2, 1	1, 2, 1
Speakers	Aurasound 3D (monitor-integrated)	AST	Compaq	Altec Lansing ACS5	Altec Lansing ACS400	Altec Lansing HP Audio System	IBM Multimedia
Microphone/Headphones/Joystick	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Modem speed (data/fax)	28.8/14.4 Kbps	28.8/14.4 Kbps DSVD	28.8/14.4 Kbps	28.8/14.4 Kbps	28.8/14.4 Kbps	28.8/14.4 Kbps	28.8/14.4 Kbps DSVD
Setup poster/Getting-started video	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Labeled ports/Color-coded cables	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Software							
Integrated suites	MS Works	PerfectWorks	PerfectWorks	MS Office	MS Office Pro for Windows 95, MS Works	MS Works	Lotus SmartSuite, MS Works
Windows front end	A.C.E.	None	Presario Gallery	None	None	Personal Page	Aptiva Guide
Finance	Quicken SE, Reuters Money Network	Quicken SE, Reuters Money Network	Quicken for Windows 4.0, Reuters Money Network	None	MS Money 95, Quicken Deluxe 5.0, Quicken SE	Quicken SE	Quicken SE, Wall Street Money
Reference	Blockbuster Video Guide, Family Doctor, Infopedia	Blockbuster Video Guide, Family Doctor, Mayo Family Clinic, Grolier's Multimedia Encyclopedia	Compton's Interactive Encyclopedia, Family Doctor	None	Mayo Family Clinic, MS Bookshelf 95, MS Cinemania 96, MS Encarta 96	MS Bookshelf 95, MS Encarta 95, MS Explorapedia: World of Nature	Blockbuster Movie Guide, Compton's Interactive Encyclopedia
Service and Support							
Standard warranty on parts/labor	3 years/3 years	1 year/1 year	3 years/1 year	3 years/1 year	3 years/1 year	1 year/1 year	3 years/3 years
On-site service included	1 year	1 year	90 days	1 year	1 year	1 year	1 year
24-hour, 7-day technical support	■	■	■	■	■	■	■

and the four-CD version of Silent Steel. It had no problems on our software compatibility tests.

Service includes remote diagnostic capabilities.—*Anush Yeghazarian*

IBM Aptiva A50. List price, \$3,878. IBM PC Co., Somers, NY; 800-426-2968; <http://www.ibm.com>. Circle 407 on reader service card

Micron Electronics Inc.

P166 Home Pro MPC

The \$3,876 P166 Home Pro MPC from Micron Electronics will fulfill your home or small office needs, but scratchy speakers may diminish the unit's appeal. The Pentium/166 Home Pro netted some of the best test scores in this roundup, which should

please its target audience of power home users. Micron also markets the Home MPC line for experienced home users, and the Millennia line of business PCs.

A setup poster, manual, and labeled ports guide you through setup. An Online Help guide

has answers to frequently asked questions, highlighted by live-action how-to videos

instructing users on parts installation and removal.

The unit's software bundle includes Microsoft Office Professional, film and book reference CDs,

REPORT CARD

Micron P166 Home Pro MPC

Setup	B
Performance	C
Sound	C
Edutainment	B
Productivity	B

Micron P166 Home Pro MPC	NEC Ready 9552	Packard Bell Designer Tower	USA Flex Multimedia Classic
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Pentium/166	Pentium/150	Pentium/133	Pentium/133
16MB EDO, 128MB	16MB, 128MB	16MB, 128MB	16MB EDO, 128MB
1.2GB Fast ATA-2	1.5GB EIDE	1.8GB EIDE	1.5GB EIDE
Diamond Stealth64 Video VRAM 3240	Integrated (S3 Trio 64V+)	Integrated (Cirrus Logic CLGD 5440)	Hercules Graphics Terminator Pro PCI
2MB VRAM	2MB DRAM	1MB DRAM	2MB VRAM
MAG InnoVision DX17T	NEC MultiSync XV15	Packard Bell 1512SL	MAG InnoVision DX17F
17, 16.3	15, 14.5	15, 13.5	17, 16.5
Sony CRD-256P (4X ATAPI)	Sony CDU76E (4X ATAPI)	Matsushita CR581 (4X ATAPI)	Acer 665A-002 (5X ATAPI)
Creative Labs Sound Blaster AWE32	NEC MediaHarmony	Packard Bell	Intel
256K pipelined-burst	256K pipelined-burst	256K asynchronous	256K pipelined-burst
Micronics	NEC/BCM	Thousand Oaks	Intel
Intel Triton	Intel Triton	Intel Triton	Intel Triton
Phoenix 4.04	AMI 1.00.03.C00Z	AMI 1.00.03.CP0R	AMI 1.00.04.C80
3 ISA, 3 PCI, 1 PCI/ISA	2 ISA, 3 PCI, 1 PCI/ISA	2 ISA, 2 PCI, 1 PCI/ISA	2 ISA, 3 PCI, 1 PCI/ISA
3, 1	3, 1	3, 1	3, 2
0, 2	0, 2	0, 1	0, 2
200W	200W	200W	230W
1, 2, 1	1, 2, 1	1, 1, 1	1, 2, 0
Advent AV370	NEC	Packard Bell	Altec Lansing Satellite 31
■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
28.8/14.4 Kbps	28.8/28.8 Kbps DSVD	28.8/14.4 Kbps	28.8/14.4 Kbps
■ ■	■ ■	■ ■	■ ■
■ ■	■ ■	■ ■	■ ■
MS Office Pro for Windows 95	MS Works for Windows 95	MS Works	PerfectOffice
None	None	Navigator	None
MS Money 95	Quicken 95	Quicken SE	None
MS Bookshelf 95, MS Cinemania 96, MS Encarta 95, MS Encarta 96 World Atlas	MS Encarta 95, MS Explorapedia: World of Nature	Mayo Family Clinic, MS Encarta 96	Compton's Interactive Encyclopedia, Family Doctor, Infopedia
3 years/1 year	3 years/3 years	1 year/1 year	3 years/lifetime
1 year	1 year	1 year	1 year
■	■	■	■

and CyberWorks software to turn your 28.8/14.4-Kbps voice modem into a full-duplex speakerphone. A 17-inch monitor and Microsoft's Sidewinder Pro joystick—a \$79 option included in the price above—came with the unit.

The unit earned the top Disk WinMark 96 score in our roundup thanks to its 1.2GB Quantum Fireball hard disk.

Its other test results were average to above average, due to powerful components such as 256K of pipelined-burst L2 cache and a Diamond Stealth Video VRAM 3240 graphics card with 2MB of VRAM.

Software compatibility tests showed no problems, but our subjective sound tests evinced significant distortion at high volumes.—David Lidsky



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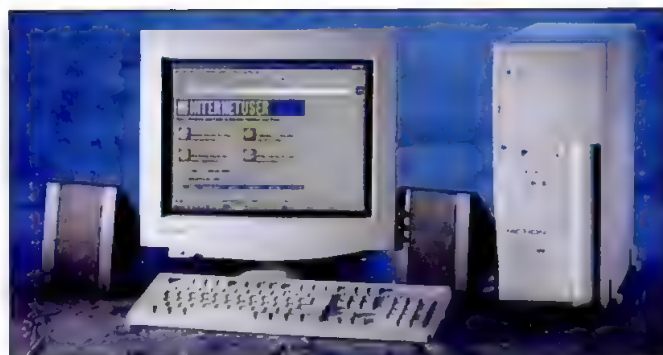
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NEC Technologies Inc.

Ready 9552

As its name asserts, NEC's \$3,498 Ready 9552 is indeed a ready and able 150-MHz Pentium PC. It offers competitive performance, setup help for beginners, and great games software. NEC also markets two PowerMate corporate lines: the entry-level V series and the high-end P series.

NEC's documentation is illustrated and easy to follow; online help is thorough and system-specific. Many of the unit's functions, such as its graphics subsystem, based on an S3 Trio 64V+ chip set and 2MB of DRAM, are integrated on the motherboard.

This minitower features a front-mounted infrared port and a remote control. The remote can operate the PC's telephony functions; it also sends commands to the Sony quad-speed CD-ROM drive and to the NEC MediaHarmony combination card, which includes a 28.8-Kbps DSVD modem and a 16-bit audio chip set with wavetable synthesis.

Verbex Voice Systems' Listen for Windows 2.0 allows the Ready to receive verbal commands and perform basic Windows functions. The unit also includes Radish Voice View software, which allows the user to transmit data and voice information simultaneously.

NEC's software bundle mixes excellent game titles like Activision's Pitfall and Delrina's Echo-

Lake with Microsoft Encarta 95 and Intuit's Quicken SE Multimedia. The unit did well on most of our software compatibility tests but could not

REPORT CARD	
NEC Ready 9552	
Setup	A
Performance	C
Sound	B
Edutainment	A
Productivity	B



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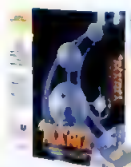
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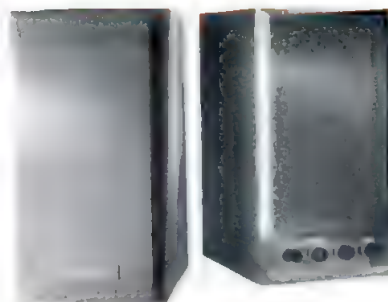
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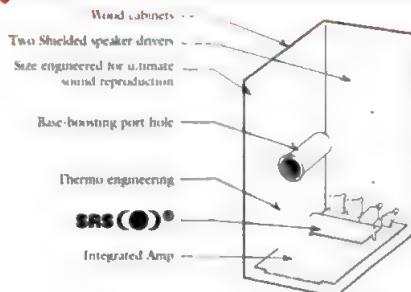
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Input sources: Max: 2 V p-p, Impedance: 100k Ohm bridging **Connector:** Stereo mini
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Drivers: Four Aurasound™ Neo-Radial™ shielded speaker drivers, **Frequency Response:** ±3db, 125Hz-15KHz, **Power:** 12 VAC @ 1.8A, 50-60Hz. (transformer included), **Dimensions:** Size 9.40" h x 4.75" w x 8.62" d, **Weight:** 9lbs



CIRCLE 232 ON READER SERVICE CARD



load one of the titles.

The Ready is equipped with two NEC 3-D stereo surround-sound speakers, a 15-inch NEC MultiSync XV15 monitor, and a 1.5GB hard disk.

On our benchmark tests, the Ready posted above-average Disk WinMark 96 and Graphics WinMark 96 scores for the group. Most of its other test scores were average.

NEC offers a three-year warranty with one year of on-site service. Remote diagnostic support is included.—*RSA*

Ready 9552. Street price: \$3,498. NEC Technologies Inc., Mountain View, CA; 800-632-4636, 508-264-8000; fax 508-264-8673; <http://www.nec.com>. *Circle 409 on reader service card.*

Packard Bell Electronics Inc.

Packard Bell Designer Tower

The \$2,998 Packard Bell Designer Tower offers lots of help for first-time users—from its step-by-step instruction posters to Navigator, a well-developed front end that will guide you through use of your PC. It also comes with some good software to keep you entertained and productivity titles to help you work. This Pentium/133-based machine's performance, however, was poor. Packard Bell also offers the Corner Computer for the home, which is distinguished by a triangular case.

With the aid of the setup poster and color-coded cables, getting your minitower PC up and running is a snap. Packard Bell's Navigator will help you find your way around and offers tutorials. One of the unit's other convenient features is its remote control, which can act as a mouse substitute, play your quad-speed CD-ROM drive, or start applications.

The system comes with a 15-inch monitor, integrated 16-bit sound, and a 28.8/14.4-Kbps data/fax modem with a distinctive ring feature. The unit also includes Call Center, an easy-to-use communications package that turns your PC into a fax and answering machine for multiple users, and full-duplex speakerphone. The machine's speakers attach to the monitor.

Most of the unit's test scores were below average for its CPU group. It used asynchronous L2 cache instead of faster synchronous cache and an older 32-bit Cirrus Logic graphics chip set; all other PCs had 64-bit chip sets. Its 1.6GB hard disk has a slow rotational speed and could not keep up with others tested. Its CD-ROM WinMark 96 score was average, however.

Packard Bell bundles its own Internet browser and titles such as Microsoft Encarta 96,

Quicken SE, Silent Steel (a game), Sports Illustrated Multimedia Almanac, and My First Encyclopedia. The unit did fairly well on our software compatibility tests.

The unit has a one-year warranty with one year of on-site service.—*AY*

Packard Bell Designer Tower. Street price, \$2,998. Packard Bell Electronics Inc., Sacramento, CA; 800-733-5858; fax, 801-579-0092; <http://www.packardbell.com>. *Circle 410 on reader service card*

USA Flex Inc.

Flex Multimedia Classic

Aimed at more experienced users buying their second or third PC, the Pentium/133-based Flex Multimedia Classic from USA Flex is an above-average performer with a good software bundle and a competitive direct price of \$2,895. The company also offers the Flex Business Workstation, aimed at corporations and businesses.

USA Flex provides some setup help: It packs a 12-step setup poster that includes a checklist of what you should find inside the box. The unit's ports are also clearly labeled.

The unit comes with an extensive bundle of software, with titles such as 95 Time Almanac, Novell's PerfectOffice, and Compton's Interactive Encyclopedia 1996. The system had no problems on our software compatibility testing.

The Multimedia Classic is equipped with powerful components such as a 1.5GB hard disk, EDO DRAM, 256K of pipelined-burst L2 cache, and a Hercules Graphics Terminator Pro PCI 2M card with the S3 Vision968 chip set plus 2MB of VRAM. A 17-inch MAG Innovision monitor, 5X Acer CD-ROM drive, 16-bit sound card, and a 28.8/14.4-Kbps data/fax modem complete the package.

The unit's well-chosen components paid off: It consistently dominated its CPU class on our tests, and its scores were even strong enough to rate above average for the entire group, which includes 166-MHz systems.

Our sound jury found the Altec Lansing Satellite 31 speakers and Intel sound chip slightly below average because of some breakup in bass.

The unit has a three-year parts, lifetime labor warranty and one year of on-site service.—*MEB* □

USA Flex Multimedia Classic. Direct price, \$2,895. USA Flex Inc., Bloomingdale, IL; 800-872-3539, 708-582-6202; fax, 708-351-7204; <http://www.usaflex.com>. *Circle 411 on reader service card.*



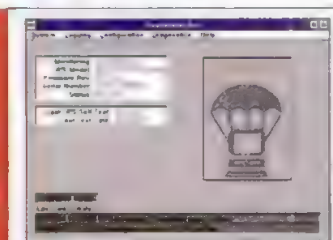
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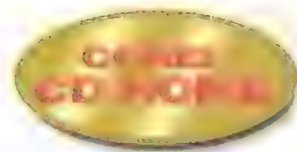
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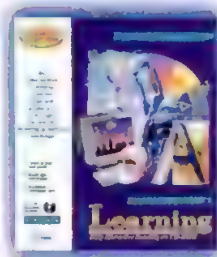
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Coming Up

The Ultimate Utilities Guide

You'll compute faster, better, and smarter if you equip yourself with the best utility software you can find. Microsoft Windows 95 and the Internet are both changing the face of computing, and both require new kinds of utilities to work optimally. We'll survey the field in 14 different categories to clue you in on the most useful additions you can make to your software collection. You'll find dozens of great solutions in this guide. Don't go to the software store without it.

For the Desktop

First we'll brief you on the tools you already have at your disposal in Windows 95, and then we'll look at products that enhance the operating system in all kinds of ways.

- *Desktop enhancers* such as Dashboard and PowerDesk make your Windows 95 experience totally customizable.
- *Uninstallers* such as CleanSweep, Remove-IT, and Uninstaller keep your hard disk clean.
- *Antivirus utilities*, both for the standalone user and for the network user, have never been more powerful.
- *File viewers* help you work with other people's files more effectively.
- *Memory utilities* help you maximize your resources above and beyond what Windows 95 can do alone.
- And *diagnostic utilities* keep an eye on potential hardware problems.

For the LAN

LAN-connected users have their own special concerns, and none are more pressing than backing up and restoring files on the network. It doesn't have to be difficult. We'll review four NetWare backup utilities that will make sure you can get your data back when disaster strikes. We'll also take a look at each utility's compatibility with other vendors' products, as well as its flexibility in heterogeneous environments.

For the Internet

Explore the Internet for a while and you'll encounter hundreds of useful utilities. We'll show you the best in three categories: Internet organizers, which help you keep track of your favorite sites and monitor your time online; Internet search utilities, which can help you narrow your search before you start paying connect-time fees; and the top 30 plug-ins and helper applications for audio, graphics, video, and virtual reality, as well as FTP clients, screening utilities to make the Web childproof, timekeepers and monitors, mail checkers, and more.

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NE—Network Edition.

To obtain the Network Edition of *PC Magazine*, call Circulation at 800-289-0429.

Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

Vive la France

Eight issues ago (December 19, 1995), we asked why a French book about Microsoft Excel was called *Excel: Fingers in the Nose*. Dozens of Francophones rushed to the rescue, and none was more articulate than our Swiss friend Adrian Bruegger, who explained that "fingers in the nose" is the literal translation of the colloquial expression "*les doigts dans le nez*," which is meant to connote "easy," "with little effort," or "with one hand tied behind your back" (or up your nose). *Bien sur. Merci, Adrian.*



My, my. How the Nike has fallen! Bo Jackson is selling printer accelerators these days. (Xante ad.)

Brian Nadel
PC Magazine
One Park Avenue
New York NY 10016
Password: 6YB0D2

Here's one mailing label that could use a good encryption algorithm. (Max Info brochure.)

Laugh in the Face of Death

Writing a will isn't usually a cause for merriment, so we award a gold star for cadaverous comedy to Nolo Press, which is promoting WillMaker 6 with the slogan "Don't Leave Earth Without It."

DIGITAL FUSION™—ADVANCED COMPOSTING FOR IBM PC's

An alternative to donating your old PC to charity. (4DVision brochure.)

If your entry is used, we'll send you \$50 and a PC Magazine T-shirt. Send your entries to Abort, Retry, Fail?, PC Magazine, One Park Ave., New York, NY 10016-5802. Winners this issue: Adrian Bruegger, Mark Kiker.



Take one step to the right, lady, and the battery won't be the only thing that's dead! (Power Express catalog.)

Musical Groaners

PC Magazine Labs technical director Larry Seltzer points out a weird humor trend on the Internet: musical instrument jokes. How this started we don't know, but let us know if you've seen any good ones. For example: Why are harps like elderly parents? Both are unforgiving and hard to get in and out of cars.

You'll find more at <http://www.mit.edu:8001/people/jcb/other-instrument-jokes.html>.



RICHARD TENNANT

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ROAD TESTED.

Recently, Stephen Taylor of North Carolina accidentally backed his car over his Dell Latitude XPI notebook. Don't ask. These things happen.

But as amazing as it may seem, his Dell Latitude notebook booted up immediately

and sustained only minor damage. Which all leads to the moral of this incredible story: if you really want a notebook that can stand up to the daily rigors of the real world, get a Dell Latitude.

Because not only are Dell Latitude notebooks powerful and affordable. They also seem to be virtually indestructible.



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The Dell Dimension XPS P166c is the latest member of Dell's Dimension XPS line, which has garnered several Editors' Choice awards. Boosted by 512K of external cache and top-of-the-line graphics capabilities, the Dimension XPS P166c is the current performance and value leader.

The Dimension XPS P166c makes the most of Intel's 166-MHz Pentium processor at a competitive price and stands as the system to beat.—JM
Dimension XPS P166c. Estimated

PC MAGAZINE
1/23/96



Dell's featured computer artist is Steven Lyons.

DELL DIMENSION LEADS PACK OF 166MHz PENTIUM DESKTOP SYSTEMS

Dell's Dimension unit will begin shipping next month. Dell's Dimension paced the 166MHz Pentium-based systems in PC Week Labs' tests (see benchmark chart, below).

PC WEEK
1/8/96



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